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Analysis of Length, Sex and Maturity Data for Short-finned Squid (Illex illecebrosus) from Samples Collected at Newfoundland, Canada, 1965 - 88

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ANALYSIS OF LENGTH, SEX AND MATURITY DATA FOR SHORT-FINNED SQUID (*ILLEX ILLECEBROSUS*) FROM SAMPLES COLLECTED AT NEWFOUNDLAND, CANADA, 1965-88

by

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ABSTRACT

Dawe, E. G., G. W. Marshall, and M. C. Mercer. 1992. Analysis of length, sex and maturity data for short-finned squid (*Illex illecebrosus*) from samples collected at Newfoundland, Canada, 1965-88. Can. Tech. Rep. Fish. Aquat. Sci. 1860: iv + 53 p.

Throughout the period 1965-88 samples of short-finned squid (*Illex illecebrosus*) were collected, when available, from the commercial inshore jigger fishery about insular Newfoundland. In addition, samples were collected offshore (on the Grand Bank) by otter trawl during May-June of some years within the period 1972-87. Here we present data summaries and some analyses of the length, sex and maturity data collected from those samples.

RÉSUMÉ

Dawe, E. G., G. W. Marshall, and M. C. Mercer. 1992. Analysis of length, sex and maturity data for short-finned squid (*Illex illecebrosus*) from samples collected at Newfoundland, Canada, 1965-88. Can. Tech. Rep. Fish. Aquat. Sci. 1860: iv + 53 p.

Entre 1965 et 1988, on a récolté des échantillons de calmars à courtes nageoires (*Illex illecebrosus*), si possible auprès des pêcheurs commerciaux autour de l'île de Terre-Neuve. De plus, des échantillons ont été récoltés au chalut à panneaux en haute mer (sur les Grands Bancs) durant mai et juin de quelques années entre 1972 et 1987. Nous présentons ici un résumé des données récoltées, ainsi que quelques analyses portant sur la longueur, le sexe et le degré de maturité des animaux étudiés.

INTRODUCTION

The short-finned squid (*Illex illecebrosus*) has a known range of distribution from central Florida to Newfoundland and Labrador (Squires 1957; Roper and Lu 1969; Hurley 1980; Dawe 1981), but it is commercially exploited within three fishery areas, all north of Cape Hatteras (Lange and Sissenwine 1983; Dawe et al. 1990). Its life span is only about one year and recruitment to fishery areas is highly variable (Hurley 1980; Dawe 1981).

Recruitment is most variable at Newfoundland, the most northern fishing area, where the fishery each year relies on recruitment of the dominant winter cohort (Squires 1967; Lange and Sissenwine 1983; Dawe et al. 1990). In the Newfoundland area short-finned squid move onto the Continental Shelf during spring (generally April-June) and can be captured by trawl. They move into coastal waters of Newfoundland, usually in early July, where they are commercially fished near shore, mainly using jigs, throughout July-November (Squires 1957; Hurley 1980; Dawe 1981).

Until the mid 1970's the Newfoundland inshore squid fishery was prosecuted mainly to secure squid for bait and annual catches did not exceed about 10,000 t. Peak catches increased dramatically since 1975, however, due to the development of food markets for squid (Hurley 1980; Dawe 1981). Within recent years annual catches have ranged between 89,000 t in 1979 and 1 t in 1986, due mainly to variation in annual recruitment.

Such dramatic variation in annual recruitment levels has resulted in the erratic collection of squid samples. Squid samples may be unavailable for various localities, months, and even entire years.

Here we present a summary, with some analysis, of the extensive but erratic seasonal samples of short-finned squid collected from the commercial jigger fishery at Newfoundland over the period 1965-88. Length, sex composition, and (for males) maturity are summarized by locality, year and time of year. In addition, length data are presented, by sex, for samples collected by research vessels on the Continental Shelf during May-June.

METHODS

COLLECTION OF DATA

Offshore squid samples were collected in spring on the southwest edge of the Grand Bank (Fig. 1). They were collected by research vessels, using otter trawls, during May-June of some years within the period 1972-87 (Tables 1 and 2). Although various types of otter trawls were used, a codend liner of 1.2 cm stretched mesh was consistently used with each.

Inshore squid samples were collected using hand-operated jigging devices, at six localities which are considered to be representative of various coastal regions (Fig. 1). Hermitage, Harbour Breton, and Rencontre West represent the South Coast (NAFO Div. 3P); Holyrood represents the East Coast (NAFO Div. 3L); Twillingate and LaScie represent the Northeast Coast (NAFO Div. 3K). Sampling has been most extensive at Holyrood, by far (Tables 3 and 4). In fact samples were acquired for only 2-4 yrs at each of the other inshore localities.

Squid samples were examined either in fresh condition or after they had been frozen and subsequently thawed. For all specimens, length, sex and (for males) maturity were determined. Dorsal mantle length (cm) was measured from the tip of the tail to the anteriodorsal protuberance. Sexual maturity was assigned to males according to a subjective scale of four stages, developed by Mercer (1973). Subsampling, for more detailed biological analysis, will not be reported on here.

SUMMARY AND ANALYSIS OF DATA

The length data were summarized by sex for each daily sample acquired from offshore (Tables 1 and 2), as well as inshore (Tables 3 and 4) areas. Parameters presented for each daily length frequency distribution for each sex include the mean, standard deviation, range, and modal length. Sample size is given, as are indices of both skewness and kurtosis (Zar 1974). Each distribution was also tested for deviation from normality, using the Shapiro-Wilk statistic, W, for samples of less than 51 (Shapiro and Wilk 1965), or the Kolomogorov-Smirnov statistic, D, for larger samples (Stephens 1974). In these and all other tests of significance, statistical significance was based on the 0.05 probability level.

Seasonal trends in squid mantle lengths available to the inshore fishery were described by applying a quadratic model of the form $L_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \epsilon$ to the individual squid length data, where t represents time in Julian days, L_t is length at time t, β_0, β_1 and β_2 are regression parameters to be estimated, and ϵ is the random error. Regression parameters, sample sizes, correlation coefficients and coefficients of variation are presented by sex in Table 5 for all localities and years. The F statistic is also provided to indicate statistical significance of the fit of the model. The students t-test was applied to each regression parameter to determine which ones differed significantly from zero.

Analysis of covariance was used to test for significant yearly differences in slopes and intercepts of quadratic equations for all localities and both sexes (Tables 6 and 7). It is recognized that the probability of committing both Type A and Type B errors is high with multiple pairwise testing, but the overall extent of yearly differences can be evaluated.

The sex composition of each daily inshore squid sample is presented (as percent males) in Table 8. Maturity, for males, was analyzed by applying probit analysis (Finney 1962; Bliss 1952) to the data on distribution of specimens among maturity classes by 1 cm length intervals. Monthly maturity ogives were generated for the extreme maturity classes (immature and mature) whereas the existence of two intermediate (maturing) maturity stages necessitated the creation of a single intermediate maturity class by pooling over original maturity stages so as to render data for intermediate stages amenable to probit analysis. The three maturity classes are related to original maturity stages as follows:

Class I = Stage 1 (immature)
Class II = Stages 1 + 2 or
Stages 3 + 4
Class III = Stage 4 (mature)

Within Class II, maturity ogives for stages 1 + 2 represent (by definition) the complement of those for stages 3 + 4 and so only the former combination of stages will be presented here. Probit analysis was used to estimate the length at which 50% of specimens had progressed from or into each maturity class, known as the 50% maturity level or, more commonly, M_{50}. Length at M_{50} is used here as an index of size at maturation in seasonal, yearly and locality comparisons.

Monthly length at M_{50} values, with 95% fiducial limits, are presented by locality and year for all three maturity classes in Tables 9-11. Regression parameters and χ^2 analysis of the fit of the probit line to empirical data are also given. Monthly data sets for any given maturity class were not amenable to probit analysis if either none or all of the specimens fell within that class (Tables 9-11).

The most complete set of length at M_{50} values was for Class I males (Table 9) and so variation in size at maturation was analyzed using that data set. Pairwise comparisons of both slopes and intercepts of monthly probit equations were performed using χ^2 analysis, to elucidate seasonal effects (Table 12), yearly effects (Table 13), and spatial effects (Table 14).

RESULTS

LENGTH FREQUENCY DISTRIBUTIONS

Daily length frequency distributions for short-finned squid collected offshore during May-June on the edge of the Grand Bank (Fig. 1) were generally not normally distributed. Distributions departed significantly from normality for 74 of 78 (95%) male daily samples (Table 1) and for 69 of 78 (88%) female daily samples (Table 2). Indeed, those few distributions which did not depart significantly from normality were associated with small samples. All distributions, for both sexes, were unimodal.

Skewness was usually positive, but this varied somewhat among years, with negative skewness being particularly prevalent in 1981 and 1984 for both males (Table 1) and females (Table 2). There was no remarkable difference in skewness between the sexes. Offshore length distributions were also generally leptokurtic (positive kurtosis), especially for 1978 males (Table 1). Platykurtosis was more common only in 1982, in 7 of 13 samples (54%) for males and 9 of 13 samples (69%) for females.

Mean lengths for most sample dates were usually smaller for males (Table 1) than females (Table 2). Considerable yearly variation in length was evident. Mean lengths in late June were smallest for the limited 1984 samples, ranging 11.79-12.37 cm for males and 11.00-12.00 cm for females. They were largest for the two large 1972 samples, ranging 16.76-16.94 cm for males and 16.98-17.52 cm for females.

Daily length frequency distributions for samples from Newfoundland inshore localities (Fig. 1) were also generally not normally distributed. Significant ($P < 0.05$) departure from normality was observed in 188 of 227 (83%) distributions for males (Table 3) and in 205 of 226 (91%) distributions for females (Table 4). Distributions which did not depart significantly from normality were generally associated with small sample sizes, as was also true for spring offshore trawl-caught samples. Most distributions were unimodal for both sexes, but multimodality (mostly bimodality) was more prevalent among distributions for females (28% occurrence, Table 4) than for males (11% occurrence, Table 3). The existence of more than one modal length was particularly prevalent for both sexes in 1966 (Tables 3 and 4), but most strikingly so for Holyrood females (81% occurrence, Table 4). Multimodality was also relatively common for females (Table 4) from Holyrood in 1979 (42% occurrence) and 1980 (55% occurrence) and for those from Rencontre West in 1965 (83% occurrence).

Skewness appeared to differ between the sexes, with positive skewness being more common among daily distributions for females (73% occurrence, Table 4), than for males (51% occurrence, Table 1). Negative skewness was overall most prevalent among Holyrood 1967 samples, occurring in 81% of samples for males (Table 3) and 63% of samples for females. There were no striking seasonal or local trends in skewness. Most distributions were leptokurtic, with no apparent difference between sexes. Positive kurtosis was evident in 62% of samples for each sex (Tables 3 and 4). The distributions for Holyrood females in 1978 were most strongly leptokurtic (Table 4). For the extensive Holyrood series platykurtosis was particularly prevalent for both sexes in 1966 (Tables 3 and 4) and for females only (82% occurrence) in 1980 (Table 4). Platykurtosis appeared to be relatively prominent at South Coast localities (Harbour Breton, Hermitage, and Rencontre West - Fig. 1) with negative kurtosis evident in 49% of samples for each sex (Tables 3 and 4).

Mean lengths were consistently greater for females (Table 4) than for males (Table 3). They generally progressed throughout the season, but for both sexes sometimes decreased between successive sampling dates (Tables 3 and 4). Such decreases were especially prevalent late in the season. The high degree of variability in sampling regimes as well as in the length data themselves render elucidation of yearly or local effects impossible, based on simple examination of mean lengths.

MODELLING THE LENGTH DATA

Regression parameters for quadratic equations, used to model seasonal trends in mantle length by locality, year and sex, are given in Table 5. Correlation coefficients were variable but generally low, ranging 0.01-0.73 (Table 5). However all F statistics, which reflect model suitability, were statistically significant. All three regression parameters generally deviated significantly from zero (Student's t-test, Table 5). Only 24 of 177 parameter estimates (14%) did not differ significantly from zero. Insignificance of regression parameters was most prevalent for both sexes from Holyrood in 1973 and 1981 and from Harbour Breton in 1979. Also, no parameter estimates differed significantly from zero for females only from Rencontre West in 1965 (Table 5). For all those cases except Holyrood 1981, samples were acquired over a period of only about one month (Tables 3 and 4).

Analysis of covariance showed that for all localities significant differences between slopes were found in 68 of 79 (86%) pairwise yearly comparisons for males (Table 6) and in 63 of 79 (80%) such comparisons for females (Table 7). Of those comparisons which showed no significant differences between slopes, only the 1975 versus 1977 comparison for Holyrood females showed no significant difference between intercepts.

SEX COMPOSITION

The sex composition of all daily samples is presented in Table 8. It frequently deviated considerably from the expected (50% males). Occurrence of males at Holyrood, for large samples ($N \geq 100$), ranged 18-75% (in 1980, Table 8). Males generally appeared to be more uncommon at all other localities than at Holyrood, with occurrence of males infrequently exceeding 50%. This was especially true for the South Coast localities of Harbour Breton, Hermitage and Rencontre West (Fig. 1), where percent males ranged 11-53% for large samples (Table 8).

MATURITY IN MALES

The fit of probit equations to monthly length and maturity data (by locality and year) varied considerably for all three maturity classes (Tables 9-11). The fit was statistically significant (χ^2, $P < 0.05$) in only 3 of 55 Class I data sets (5%, Table 9), in 5 of 37 Class II data sets (14%, Table 10), and in 2 of 23 Class III data sets (9%, Table 11). Although the fit of the probit model to empirical data was generally poor, 95% fiducial limits about length at M_{50} values were generally narrow, ranging less than 2.0 cm in 71% of data sets for Class I (Table 9), in 70% of those for Class II (Table 10), and in 57% of those for Class III. For all localities, length at M_{50} generally declined throughout the season for most yearly data sets and all three maturity classes (Tables 9-11).

Monthly differences between slopes of Class I probit equations were statistically significant (Chi square, $P < 0.05$) in only 2 of 23 pairwise comparisons (6%, Table 12). Among those 31 cases where slopes were similar, intercepts were significantly different in 18 comparisons (58%). With only two exceptions, failure to demonstrate significant differences between intercepts (when slopes were similar) involved comparisons of consecutive months (Table 12).

Yearly differences (by month) between slopes of Class I probit equations were significant in 10 of 37 pairwise comparisons (27%), using the relatively extensive Holyrood data series (Table 13). Among those 27 cases where slopes were similar, intercepts differed significantly in 20 comparisons (74%, Table 13).

Locality differences (by year and month) between slopes of Class I probit equations were significant in 6 of 20 pairwise comparisons (30%, Table 14). Five of those six differences were between Holyrood and a South Coast locality (i.e. Harbour Breton, Hermitage or Rencontre West, Fig. 1). Among those 14 cases where slopes were similar, significant differences between intercepts were found in 10 comparisons (71%, Table 14).

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Table 1. Summary of some descriptive statistics for individual daily male short-finned squid length frequency distributions from spring offshore bottom-trawl surveys. Only values of D or W in parentheses are not significant at the 0.05 probability level.

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1972	June	27	254	16.94	2.098	11-22	17.5	-0.384	-0.625	0.193
		29	487	16.76	1.065	14-20	17	0.041	-0.233	0.185
1973	May	26	62	13.34	0.904	11-16	13	-0.048	1.084	0.227
		29	44	13.39	1.368	10-16	13	-0.350	-0.387	0.934
		30	31	13.42	1.478	9-15	14	-1.454	2.048	0.819
1974	June	22	32	16.41	1.266	13-18	17	-1.148	0.811	0.828
1978	June	6	116	14.38	1.027	10-17	14	-1.751	7.064	0.270
		7	417	14.44	1.318	10-21	14	1.540	3.952	0.284
		8	130	16.72	1.657	12-23	17	0.046	0.994	0.151
		9	335	14.78	1.120	12-19	15	0.322	0.276	0.190
		10	362	14.31	1.409	9-19	14	0.626	0.936	0.232
		11	347	14.25	1.427	9-23	14	1.111	4.988	0.232
		12	313	14.35	1.040	12-19	14	0.865	2.130	0.237
		13	35	14.08	1.269	12-17	14	0.472	0.046	0.922
		17	38	14.76	0.883	13-18	15	1.242	3.717	0.824
		18	350	15.19	1.100	13-19	15	0.914	1.075	0.255
		19	96	15.41	1.738	13-22	15	1.523	2.315	0.290
		22	379	15.30	0.981	13-18	15	0.205	0.481	0.262
		24	28	15.07	1.086	14-19	15	1.903	5.461	0.766
		25	44	15.32	1.308	13-19	15	0.810	0.382	0.902
1979	June	7	76	15.68	0.716	14-18	16	0.552	0.450	0.251
		17	176	15.61	1.116	13-19	15	0.524	0.598	0.224
		18	82	16.06	0.998	14-19	16	0.181	0.150	0.207
		19	96	16.10	1.174	14-20	16	0.671	0.640	0.233
		20	130	15.78	0.932	13-18	16	-0.081	-0.275	0.200
		21	87	16.57	0.923	14-19	17	0.139	0.467	0.216
		22	292	16.89	1.107	14-21	17	0.188	0.462	0.207
		23	159	17.14	1.193	14-20	17	0.204	-0.126	0.188
		24	258	16.96	1.131	13-20	17	0.052	0.281	0.206
		25	275	17.04	1.066	14-21	17	0.349	0.363	0.200
		26	471	16.37	1.196	14-20	16	0.152	0.032	0.165
		27	31	16.35	1.082	14-18	16	-0.274	-0.057	0.896
		28	54	16.37	0.896	15-18	16	0.161	-0.654	0.234

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Table 1 (Cont'd.)

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1980	June	8	60	13.23	0.945	11-16	13	0.629	1.875	0.314
		9	196	13.30	1.130	10-17	13	0.009	0.432	0.186
		10	8	13.40	0.744	12-14	13.5	-0.824	-0.151	0.707
		13	21	13.86	2.104	11-17	13	0.421	-1.447	0.851
		15	62	13.43	1.543	11-18	13	0.692	0.382	0.192
		16	171	13.28	1.347	10-16	13	-0.087	-0.746	0.177
		20	15	13.07	1.437	11-16	13	1.032	0.715	0.862
		21	108	14.14	0.981	12-19	14	1.532	5.726	0.315
		22	126	14.93	0.812	13-18	15	0.406	0.718	0.243
1981	June	13	28	16.61	1.066	15-19	17	0.094	-0.411	0.907
		14	265	16.36	1.043	12-19	16	-0.608	12.207	0.224
		15	409	16.52	1.027	12-19	17	-0.705	1.766	0.213
		16	157	16.42	1.063	12-19	16	-0.292	1.299	0.201
		17	442	16.15	1.861	10-21	17	-1.366	1.330	0.289
		18	266	16.16	1.437	11-19	16	-1.217	2.582	0.242
		19	476	16.98	1.012	13-21	17	0.139	2.237	0.242
		20	462	16.89	0.922	12-20	17	-0.291	2.583	0.228
		21	463	16.51	0.982	13-22	17	0.343	2.600	0.204
		28	18	16.22	0.647	15-17	16	-0.229	-0.411	0.786
1982	May	26	97	14.43	1.406	11-18	14	0.036	-0.411	0.157
		27	92	15.15	1.128	12-18	15	0.209	0.211	0.227
		31	65	12.74	2.018	6-17	13	-1.031	2.251	0.213
	June	1	118	13.93	1.372	11-17	14	0.523	-0.377	0.207
		2	255	14.51	1.368	12-18	15	-0.122	-0.616	0.176
		3	35	15.37	1.750	11-18	16	-1.133	0.886	0.865
		5	317	14.23	1.193	11-17	14	0.086	-0.600	0.185
		6	62	14.02	1.868	11-18	14	-0.055	-0.414	0.158
		7	46	14.67	1.334	12-18	14	0.518	-0.274	0.911
		8	228	14.54	1.452	10-18	14	1.452	0.186	0.181
		9	43	15.05	1.396	13-19	5	0.519	-0.031	0.918
		10	96	13.47	1.305	10-17	14	0.055	0.205	0.189
		11	14.85	16	1.668	11-17	15	-0.661	0.380	(0.931)
1983	June	4	10	10.30	1.418	9-14	10	2.261	6.098	0.687
		6	25	12.52	1.194	9-14	13	-1.008	1.700	0.879
		7	8	14.25	1.389	13-17	14	1.120	1.106	(0.857)
1984	June	22	9	12.11	1.269	10-14	12	-0.260	-0.700	(0.947)
		25	44	11.79	1.091	9-14	12	-0.361	-0.268	0.915
		26	8	12.37	1.685	10-15	13	-0.310	-0.147	(0.866)

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Table 1 (Cont'd.)

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1987	June	7	16	16.69	0.704	16-18	17	0.537	-0.643	0.787
		8	28	16.75	0.751	15-18	17	-0.669	0.703	0.809
		10	586	16.46	1.184	11-19	17	-0.575	1.273	0.181
		13	60	15.78	1.415	12-18	16	-1.160	2.102	0.244
		14	180	14.33	2.065	9-19	14	0.010	-1.004	0.162
		15	752	15.53	1.228	10-19	16	-0.700	1.303	0.182
		16	339	15.83	1.089	11-19	16	-0.687	2.780	0.242

Table 2. Summary of some descriptive statistics for individual daily female short-finned squid length frequency distributions from spring bottom-trawl surveys. Only values of D or W in parentheses are not significant at the 0.05 probability level.

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1972	June	27	303	17.52	2.145	11-22	18	-0.241	-0.676	0.138
		29	530	16.98	1.137	14-21	17	0.362	0.507	0.197
1973	May	26	55	13.73	0.971	11-16	14	-0.299	0.282	0.229
		29	51	13.84	1.302	11-18	14	0.246	1.378	0.234
		30	32	12.97	2.221	6-16	13.5	-1.276	2.136	0.895
1974	June	22	54	16.78	1.254	13-19	17	-1.350	2.877	0.274
1978	June	6	123	14.67	0.919	13-17	15	0.631	0.617	0.232
		7	275	14.95	1.688	10-23	15	1.532	3.062	0.265
		8	89	17.55	1.960	13-21	18	-0.337	-0.299	0.142
		9	289	14.91	1.321	12-20	15	0.806	0.660	0.225
		10	424	14.90	1.725	11-21	14	0.654	0.026	0.218
		11	520	14.84	1.634	11-20	14	0.931	0.640	0.209
		12	346	14.40	1.320	12-20	14	1.229	2.716	0.232
		13	41	13.68	1.457	12-19	13	1.454	3.124	0.849
		17	34	15.23	1.075	13-19	15	1.075	2.599	0.867
		18	252	15.51	1.283	13-20	15	0.938	1.237	0.211
		19	98	16.37	2.107	13-21	16	0.392	-0.899	0.170
		22	200	15.96	0.907	15-18	16	0.365	-1.094	0.250
		24	16	15.75	1.612	13-19	15.5	0.463	-0.130	(0.945)
		25	43	15.16	1.252	12-18	15	0.288	0.457	0.917
1979	June	7	98	16.09	0.826	14-18	16	0.386	0.205	0.289
		17	184	16.08	1.290	13-22	16	0.840	2.083	0.228
		18	93	16.46	1.403	14-20	16	0.356	-0.284	0.177
		19	115	19.96	1.611	13-23	17	0.698	1.207	0.170
		20	169	16.36	1.178	14-22	16	0.925	2.591	0.177
		21	112	17.06	1.317	14-21	17	0.268	0.417	0.171
		22	303	17.41	1.309	12-21	18	-0.380	0.897	0.176
		23	141	17.56	1.504	14-22	17	0.259	0.089	0.158
		24	244	17.24	1.262	14-21	17	0.208	0.320	0.180
		25	210	17.48	1.367	14-23	17	1.148	3.057	0.215
		26	338	16.64	1.364	14-21	17	0.549	0.917	0.196
		27	36	16.64	1.552	13-21	17	0.259	0.914	(0.959)
		28	41	16.36	1.156	15-19	16	0.650	-0.393	0.867

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Table 2 (Cont'd.)

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1980	June	8	59	13.83	1.069	12-17	14	0.701	0.599	0.234
		9	224	13.50	1.108	11-18	13	0.747	1.887	0.214
		10	10	13.50	1.434	12-16	13	1.313	0.238	0.791
		13	16	14.81	1.424	12-17	15	-0.416	-0.787	(0.912)
		15	62	13.84	1.333	12-17	14	0.477	-0.174	0.161
		16	145	13.59	1.455	10-17	14	-0.029	0.037	0.169
		20	10	14.40	2.757	12-21	13.5	1.785	3.298	0.801
		21	110	14.59	0.941	11-17	15	-0.367	1.323	0.241
		22	130	15.19	1.182	12-20	15	1.250	4.035	0.257
1981	June	13	23	17.35	1.335	15-19	17	-0.232	-0.763	0.886
		14	244	16.73	1.111	13-21	17	-0.192	1.762	0.194
		15	266	16.86	1.090	12-19	17	-0.467	1.505	0.192
		16	158	16.77	1.215	13-20	17	-0.006	0.469	0.201
		17	445	16.66	1.970	11-22	17	-0.899	1.017	0.217
		18	260	16.66	1.447	10-21	17	-0.942	3.225	0.204
		19	321	17.54	1.196	14-22	17	0.611	1.704	0.198
		20	316	17.41	1.332	11-23	17	0.397	3.686	0.218
		21	438	16.91	1.275	13-22	17	0.368	0.810	0.188
		28	13	16.77	0.438	16-17	17	-1.451	0.094	0.533
1982	May	26	100	14.72	1.583	11-18	15	-0.118	-0.483	0.160
		27	102	15.12	1.027	13-18	15	-0.039	-0.024	0.202
		31	41	13.24	2.353	8-17	13	-0.102	-0.0294	(0.941)
	June	1	140	14.62	1.728	11-20	15	0.322	0.050	0.137
		2	264	14.95	1.581	11-19	15	-0.151	-0.161	0.142
		3	23	16.09	1.125	14-18	16	0.235	-0.754	0.910
		5	23	14.62	1.457	14-18	16	0.235	-0.754	0.910
		6	359	14.92	1.457	11-19	15	0.308	-0.192	0.161
		7	56	15.46	1.618	13-19	15.5	0.187	-1.118	0.210
		8	211	14.86	1.594	10-20	15	0.121	0.418	0.152
		9	33	15.61	1.116	13-18	15	0.003	-0.213	0.922
		10	73	14.12	1.584	10-19	14	0.264	0.702	0.168
		11	17	14.82	1.237	13-17	15	0.376	-0.717	(0.913)
1983	June	4	6	13.67	3.777	9-18	15	-0.581	-1.651	0.842
		6	21	13.24	1.480	10-16	13	-0.351	0.061	(0.951)
		7	10	15.30	1.703	13-18	15	0.091	-0.993	(0.939)

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Table 2 (Cont'd.)

Year	Date		N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
1984	June	22	15	12.20	1.265	10-14	12	0.059	-1.003	(0.918)
		25	42	11.95	1.430	9-14	12	-0.175	-0.677	0.916
		26	6	11.00	2.098	8-14	11	0.000	-0.248	(0.960)
1987	June	7	16	16.94	0.929	15-18	17	-0.435	-0.554	0.871
		8	43	16.95	0.950	15-19	17	0.445	-0.247	0.881
		10	684	16.79	1.231	11-20	17	-0.398	0.850	0.183
		13	39	16.31	1.704	11-19	17	-0.914	1.003	0.909
		14	171	15.03	2.136	10-19	16	-0.354	-0.873	0.195
		15	811	15.81	1.501	10-21	16	-0.530	1.608	0.165
		16	294	16.25	1.354	9-19	16	-1.760	7.333	0.243

Table 3. Summary of some descriptive statistics for individual daily male short-finned squid length frequency distributions from Newfoundland inshore localities. Only values of D or W in parenthesis are not significant at the 0.05 probability level.

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1965	Sept. 3	101	21.85	1.043	19-25	22	0.088	0.411	0.210
	Sept. 20	26	22.81	1.021	21-25	22, 24	0.416	-0.910	(0.85)
	Sept. 21	19	22.74	1.284	20-25	23	-0.681	0.711	(0.90)
	Oct. 18	15	24.13	0.915	23-26	24	0.351	-0.484	(0.88)
	Oct. 20	77	24.29	1.168	22-28	24	0.689	1.295	0.220
	Oct. 22	15	23.93	1.486	22-26	24, 22	-0.020	-1.204	(0.88)
	Nov. 13	138	24.26	1.013	21-26	24	-0.374	0.254	0.210
1966	July 20	178	18.78	1.145	15-21	19	-0.327	0.282	0.175
	July 29	196	17.48	1.577	14-21	17	0.236	-0.841	0.176
	Aug. 4	191	17.83	1.882	13-24	17, 20	0.314	-0.036	0.183
	Aug. 10	119	20.26	1.884	15-24	21	-0.694	-0.021	0.182
	Aug. 12	126	20.29	2.146	15-24	21, 17	-0.495	-0.495	0.193
	Aug. 18	91	20.70	2.079	16-26	21, 18	-0.571	0.118	0.172
	Aug. 25	142	21.55	1.313	18-25	22	-0.433	0.280	0.205
	Sept. 1	150	21.76	1.621	17-25	22	-0.745	0.338	0.219
	Sept. 9	151	22.32	1.787	17-26	23, 20	-0.663	-0.159	0.237
	Sept. 16	142	21.62	1.825	17-25	24, 21	-0.024	-0.878	0.147
	Sept. 22	103	22.84	1.675	19-26	24, 21	-0.321	-0.556	0.170
	Sept. 23	140	21.11	1.281	19-25	21	0.450	-0.030	0.207
	Oct. 12	123	23.21	1.569	20-27	24, 22	-0.060	-0.457	0.172
	Oct. 19	146	23.21	1.699	18-26	24, 22, 19	-0.595	0.267	0.158
	Oct. 26	89	22.97	1.385	20-27	23	0.376	0.499	0.164
	Nov. 2	133	21.39	1.502	18-25	21	0.125	-0.294	0.159
1967	July 17	297	18.99	1.036	15-23	19	0.014	0.931	0.211
	July 26	258	20.19	1.099	16-23	20	-0.231	0.337	0.179
	Aug. 1	273	20.66	1.266	15-23	21	-1.193	2.803	0.219
	Aug. 8	258	20.89	1.218	16-25	21	-0.364	1.091	0.175
	Aug. 14	216	21.39	1.282	17-25	22	-0.435	0.844	0.187
	Aug. 24	271	21.60	1.583	17-26	22	-0.729	0.708	0.182
	Sept. 1	248	21.67	1.856	16-26	22	-0.528	-0.132	0.172
	Sept. 15	125	23.41	1.362	20-27	23	-0.036	-0.274	0.148
	Sept. 19	201	23.85	1.068	21-27	24	-0.061	-0.057	0.209
	Sept. 28	221	23.69	1.174	19-27	24	-0.521	1.526	0.187
	Oct. 3	99	23.95	0.952	21-26	24	-0.405	0.357	0.248
	Oct. 18	201	25.07	0.943	23-28	25	0.031	0.026	0.218
	Oct. 23	186	25.13	1.032	21-28	25	-0.501	1.408	0.224
	Nov. 6	148	25.01	0.884	23-27	25	0.047	-0.203	0.226
	Nov. 15	205	25.05	0.090	22-29	25	-0.030	1.726	0.243
	Nov. 23	241	24.76	1.207	19-28	25	-0.999	2.509	0.233

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1971	July 6	422	17.86	1.454	15-22	17	0.320	-0.484	0.169
	July 12	344	18.54	1.410	15-22	18	0.092	-0.391	0.149
	July 19	327	18.34	1.313	15-22	18	0.133	-0.305	0.178
	July 28	71	19.39	1.213	16-22	19	-0.018	0.462	0.191
	Aug. 3	287	19.31	1.366	14-24	19	-0.126	0.964	0.183
	Aug. 10	211	20.79	1.131	18-24	21	-0.139	0.128	0.194
	Aug. 18	250	21.32	1.166	17-25	21	-0.380	1.511	0.187
	Aug. 23	261	21.37	1.021	19-25	21	-0.075	0.009	0.190
	Aug. 31	241	21.97	0.950	19-25	22	0.058	0.738	0.231
	Sept. 10	196	22.42	0.900	20-26	22	0.210	0.656	0.227
	Nov. 1	60	23.87	1.142	21-26	24	-0.295	0.112	0.196
	Nov. 10	109	23.98	1.097	21-26	24	-0.478	0.192	0.204
1973	July 20	352	18.85	1.332	15-23	19	0.047	0.100	0.145
	Aug. 7	90	20.18	1.387	17-23	18, 20	-0.197	-0.393	0.193
	Aug. 22	233	21.79	1.274	18-25	22	-0.242	0.078	0.179
1975	Aug. 22	220	22.61	1.111	19-25	23	-0.449	0.646	0.210
	Sept. 18	164	23.55	1.005	20-26	24	-0.079	0.894	0.208
	Oct. 29	171	24.04	0.993	21-26	24	-0.217	0.123	0.234
1976	Aug. 31	177	22.60	1.034	20-25	23	-0.050	0.069	0.203
	Sept. 27	83	23.82	0.872	22-26	24	0.250	0.214	0.237
	Nov. 3	135	22.48	0.976	20-25	22	0.175	0.066	0.222
1977	July 25	22	19.68	1.041	18-22	19	0.438	-0.302	(0.90)
	Aug. 1	45	20.98	1.215	19-24	20	0.601	0.403	(0.90)
	Aug. 22	37	21.59	0.762	20-23	22	0.060	-0.269	(0.85)
	Aug. 29	12	21.08	1.165	18-22	21	-1.847	4.132	(0.75)
	Nov. 17	14	23.36	0.842	22-25	23	0.074	-0.182	(0.89)
1978	July 12	115	17.43	1.036	15-20	17	0.250	0.064	0.202
	July 19	152	17.88	1.220	15-22	18	0.620	1.018	0.196
	July 27	140	18.99	1.322	15-22	19	0.013	0.009	0.159
	Aug. 1	129	20.41	1.482	16-24	21	-0.401	0.281	0.181
	Aug. 22	144	20.03	1.131	17-24	20	0.902	2.076	0.228
	Aug. 29	61	20.08	1.053	18-24	20	0.981	2.683	0.236
	Sept. 8	104	21.13	1.080	19-25	21	0.859	1.286	0.223
	Sept. 12	151	21.83	1.074	20-25	22	0.500	0.226	0.220
	Sept. 18	153	21.94	0.995	20-25	22	0.688	0.989	0.235
	Sept. 26	104	21.78	0.836	20-24	22	0.235	-0.136	0.220

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1978	Oct. 6	128	22.17	1.005	17-25	22	-0.779	4.873	0.240
	Oct. 12	132	22.16	0.770	21-24	22	0.228	-0.328	0.271
	Oct. 20	124	22.27	0.938	20-24	22	-0.077	-0.090	0.233
	Oct. 24	132	22.39	0.863	20-24	22	-0.137	-0.044	0.229
	Oct. 31	36	22.44	0.843	21-24	23	-0.118	-0.507	(0.86)
	Nov. 2	109	22.00	0.943	18-24	22	-0.810	1.970	0.234
	Nov. 6	115	22.35	1.052	19-25	22	-0.325	0.349	0.188
	Nov. 17	188	21.69	0.954	19-25	22	-0.094	0.786	0.244
1979	July 2	163	18.15	1.114	15-21	18	0.174	-0.040	0.187
	Aug. 17	122	18.46	1.100	16-21	18	-0.008	-0.320	0.178
	Aug. 13	160	20.44	1.114	18-23	20	0.189	-0.034	0.173
	Aug. 21	60	21.35	1.313	17-25	22	-0.173	1.725	0.177
	Aug. 22	102	21.46	1.002	20-24	21	0.351	-0.744	0.265
	Sept. 6	19	21.53	1.124	20-25	21	1.633	4.315	(0.81)
	Sept. 10	42	22.62	1.268	20-25	23	1.268	-0.264	(0.90)
	Sept. 12	62	22.77	1.108	20-26	22	0.167	0.825	0.193
	Sept. 28	177	22.92	0.991	21-27	23	0.727	1.423	0.220
	Oct. 8	192	22.73	1.180	20-27	23	0.309	0.570	0.185
	Oct. 23	192	22.46	1.193	20-26	22	0.380	-0.192	0.212
	Nov. 20	144	23.06	1.069	20-26	23	0.166	0.206	0.215
1980	July 15	180	17.92	0.977	15-20	18	-0.097	-0.283	0.192
	Aug. 11	231	19.91	1.082	16-23	20	-0.234	0.850	0.196
	Aug. 22	135	20.33	1.078	18-23	20	0.370	0.133	0.234
	Aug. 28	125	20.34	1.085	19-25	20	1.183	2.748	0.230
	Sept. 2	85	20.94	1.073	19-24	21	0.415	0.332	0.196
	Sept. 17	75	21.00	1.115	18-24	21	0.601	0.705	0.260
	Sept. 17	59	21.90	1.045	20-26	22	1.053	3.041	0.241
	Sept. 22	64	21.89	0.911	20-25	22	0.482	1.397	0.249
	Sept. 30	40	21.63	0.897	20-24	21	0.838	0.976	(0.84)
	Oct. 10	51	21.86	1.040	20-25	22	0.730	0.952	0.251
	Oct. 15	35	21.86	1.033	20-25	22	0.811	1.551	(0.89)
1981	July 15	197	18.57	1.021	16-22	18	0.394	0.159	0.214
	July 24	200	18.23	1.145	16-22	18	0.137	0.277	0.167
	July 30	109	19.90	1.170	15-23	20	-0.578	2.199	0.204
	Aug. 11	169	18.59	0.798	16-21	19	-0.391	1.175	0.266
	Aug. 18	124	19.69	1.251	16-22	20	-0.286	0.024	0.194
	Aug. 26	152	19.36	0.715	18-21	19	0.222	-0.092	0.299
	Aug. 31	176	19.57	0.929	17-23	20	0.490	1.086	0.212
	Sept. 11	107	20.96	1.115	18-25	21	0.615	1.173	0.216

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1985	Aug. 14	321	19.07	1.194	14-23	19	-0.255	1.276	0.200
	19	334	19.83	1.134	15-23	20	-0.251	1.039	0.204
	28	236	20.68	1.074	17-23	21	-0.626	1.349	0.209
	Sept. 4	24	20.33	1.736	17-23	21	-0.564	-0.524	0.897
	5	163	18.91	2.754	14-24	19	0.037	-1.518	0.198
	6	12	18.33	2.500	15-23	17.5	0.636	-0.544	0.933
	12	171	21.71	1.566	15-25	22	-1.197	2.415	0.222
1988	Aug. 23	42	19.02	1.439	16-21	19	-0.198	-1.005	0.908
	24	220	19.31	1.638	16-24	19	0.430	0.050	0.158
	25	15	18.87	1.726	15-22	19	-0.341	0.710	0.948
	Sept. 5	58	19.53	1.417	16-23	19	0.502	0.675	0.199
	7	4	17.25	2.217	15-20	17	0.481	-1.699	0.964
	15	5	20.00	1.581	18-22	20	0.000	-1.200	0.986
	18	236	20.97	1.284	16-24	21	-0.349	0.582	0.159
	20	26	21.27	1.116	18-23	21	-1.143	2.080	0.858
Twillingate									
1978	July 28	70	17.34	0.976	15-19	17	-0.072	-0.268	0.223
	Aug. 10	52	19.79	0.871	18-23	20	0.804	2.513	0.250
	Aug. 31	55	19.05	1.352	17-24	19	1.015	2.143	0.207
	Sept. 6	44	21.64	1.080	19-24	21.5	-0.138	0.647	(0.91)
	Sept. 7	81	17.42	1.474	15-24	17	1.303	3.900	0.217
	Sept. 15	41	20.78	1.255	18-23	21	-0.120	-0.118	(0.93)
	Sept. 19	44	21.23	0.961	19-24	21	0.505	0.940	(0.89)
	Sept. 27	53	21.62	0.882	20-24	21	0.310	-0.027	0.232
	Sept. 28	65	21.34	1.004	19-24	21	0.508	0.827	0.217
1979	Sept. 8	136	22.77	0.996	21-25	23	0.062	-0.626	0.193
	Sept. 15	113	22.58	1.266	20-26	23	0.392	-0.201	0.170
	Sept. 22	81	22.28	1.063	20-25	22	0.299	0.643	0.247
	Sept. 29	64	22.56	1.097	20-25	22	0.209	-0.201	0.196
	Oct. 5	88	23.10	0.983	21-26	23	0.014	0.312	0.220
1980	Aug. 5	108	19.88	1.917	16-22	20	-0.429	0.531	0.197
	Aug. 14	49	20.35	0.948	19-23	20	0.615	0.191	(0.87)
	Aug. 22	62	21.00	0.958	19-23	21	0.462	0.109	0.274
	Aug. 30	83	21.24	1.055	19-25	21	0.521	1.395	0.217
	Sept. 12	54	21.80	0.959	20-25	22	0.694	1.422	0.231
	Oct. 11	89	22.02	1.138	20-25	22	0.334	-0.045	0.205

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Twillingate									
1981	Aug. 8	91	19.99	1.683	17-25	20.5	0.332	-0.089	0.128
	Aug. 12	136	19.99	1.542	16-25	21	0.123	0.185	0.133
	Aug. 22	148	19.61	1.652	16-24	19	0.194	-0.234	0.159
Harbour Breton									
1966	Aug. 3	172	18.25	1.553	15-23	19	0.125	-0.256	0.133
	Aug. 4	116	18.24	1.530	14-23	17, 19	-0.001	0.474	0.155
	Aug. 17	28	19.71	1.357	16-21	21	-1.161	1.116	(0.82)
	Sept. 13	140	21.25	2.025	17-25	19, 22	-0.057	-1.198	0.153
	Sept. 26	26	24.27	1.614	18-27	25	-2.455	8.893	(0.70)
	Sept. 29	125	20.31	1.273	17-25	20	0.442	1.507	0.171
	Oct. 20	6	19.67	0.516	19-20	20	-0.968	-1.875	(0.64)
	Oct. 22	131	20.34	1.269	18-25	20	0.674	0.848	0.185
	Oct. 24	47	19.96	1.334	18-23	20	0.367	-0.366	(0.92)
	Oct. 26	93	19.43	1.370	17-25	19	1.094	2.394	0.204
	Nov. 1	50	20.42	1.762	17-24	20, 22	0.045	-0.861	(0.94)
1979	Aug. 20	17	20.65	1.115	18-22	21	-0.726	0.520	(0.89)
	Aug. 22	20	21.40	0.821	20-23	21	0.355	-0.065	(0.86)
	Sept. 4	32	20.44	1.014	19-22	20	0.181	-0.995	(0.87)
	Sept. 6	31	20.84	1.293	19-24	21	0.814	0.734	(0.89)
	Sept. 7	19	20.58	0.692	19-22	21	-0.314	0.272	(0.83)
	Sept. 17	13	20.77	1.301	18-22	21	-1.109	0.290	(0.80)
	Sept. 18	30	22.40	1.037	20-24	22	-0.111	-0.308	(0.91)
Hermitage									
1978	July 31	143	18.04	1.224	15-21	18	-0.114	0.074	0.167
	Aug. 31	104	20.41	1.048	17-23	21	-0.282	0.539	0.212
	Sept. 30	88	20.90	0.885	19-23	21	0.306	0.515	0.272
1979	Aug. 1	70	18.76	1.654	16-23	18, 20	0.677	-0.169	0.234
	Aug. 6	38	18.05	1.576	15-22	17	0.390	0.179	(0.94)
	Aug. 13	9	21.22	0.972	20-23	21	0.502	-0.009	(0.90)
	Aug. 20	15	21.07	1.033	19-23	21	-0.149	0.010	(0.93)
	Aug. 27	10	20.40	0.966	18-21	21	-1.959	4.187	(0.68)
	Oct. 1	94	21.34	0.968	19-23	21	0.065	-0.682	0.212

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Hermitage									
1981	July 24	30	19.03	1.402	17-22	19, 21	0.420	-0.650	(0.89)
	Aug. 3	43	18.49	1.352	16-21	17, 19.5	-0.005	-1.058	(0.91)
	Aug. 11	106	20.33	1.075	17-23	20	-0.087	0.583	0.181
	Aug. 19	133	20.14	1.347	17-23	20	-0.024	-0.461	0.146
	Aug. 26	83	21.23	1.408	17-24	21	-0.285	0.469	0.170
	Aug. 31	75	20.97	1.498	18-25	21	-0.003	0.014	0.160
	Sept. 7	170	20.78	1.272	18-25	20, 22	0.341	-0.459	0.212
	Sept. 15	69	10.78	1.235	18-24	21	0.188	-0.226	0.169
Rencontre West									
1965	July 29	9	15.78	1.481	13-17	17	-0.999	-0.187	(0.83)
	Aug. 7	121	17.64	1.642	11-21	17	-0.376	1.667	0.174
	Aug. 14	72	17.39	2.046	13-20	15, 19	-0.658	-0.794	0.214
	Aug. 23	115	19.46	2.486	15-26	18, 23	0.382	-0.631	0.139
	Aug. 30	23	16.74	0.752	16-18	16	0.485	-1.001	(0.79)
1966	July 26	50	18.16	1.434	16-22	18, 21	0.746	0.325	(0.90)
	Aug. 9	133	19.09	1.438	15-22	20	-0.533	0.267	0.180
	Aug. 24	160	19.01	1.865	15-23	18, 20	0.050	-0.634	0.124
	Sept. 8	195	17.80	1.645	14-23	17	0.640	0.743	0.184
	Sept. 20	180	19.19	1.603	16-25	19	0.797	1.066	0.215
	Sept. 21	150	19.65	1.511	16-25	19, 23	0.915	1.268	0.189
1967	Aug. 7	204	17.45	1.075	15-20	17	-0.016	-0.533	0.182
	Aug. 14	278	16.55	1.342	13-21	16	0.563	0.770	0.187
	Aug. 23	266	18.29	1.065	15-21	18	0.052	-0.117	0.177
	Aug. 28	138	18.28	1.016	16-21	18	0.354	0.588	0.215
	Sept. 4	229	18.27	1.111	15-22	18	0.359	0.917	0.229
	Sept. 13	257	20.53	1.228	18-24	20	-0.014	-0.201	0.164
	Sept. 18	464	20.99	1.355	15-24	21	-0.773	1.245	0.186
	Oct. 2	229	20.73	1.618	17-24	20, 22	-0.186	-0.661	0.168
	Oct. 9	169	21.99	1.776	17-26	22	-0.472	-0.106	0.201
	Oct. 16	175	20.87	2.279	16-25	19, 23	-0.004	-1.179	0.151

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Table 3 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
La Scie									
1965	Aug. 11	91	21.09	1.061	19-23	22	-0.293	-0.739	0.223
	Aug. 17	89	21.09	1.231	17-23	21	-0.474	0.261	0.189
	Aug. 24	94	21.56	1.169	17-24	21	-0.940	2.706	0.208
	Sept. 1	99	21.67	1.278	17-26	22	-0.576	3.520	0.230
	Sept. 14	90	20.41	2.360	15-24	19.23	-0.151	-1.160	0.147
1980	Aug. 29	154	21.20	1.031	19-24	21.1	0.129	0.568	0.221
	Sept. 9	181	21.27	0.959	17-24	20.75	-0.567	2.219	0.229
	Sept. 16	161	21.33	0.886	19-24	21.1	0.175	-0.084	0.254
	Sept. 21	29	21.59	0.867	20-23	22	-0.462	-0.325	0.843
	Sept. 26	104	21.57	1.00	19-24	22	-0.159	0.446	0.225
1981	Sept. 9	161	20.35	0.875	18-23	20.1	0.107	0.649	0.245
	Sept. 14	197	21.41	1.142	18-25	+21.75	0.014	0.643	0.199
	Oct. 1	134	20.40	1.527	15-24	21	-0.167	0.481	0.152
1982	Aug. 6	205	19.53	1.069	17-22	+20.1	-0.363	-0.175	0.211
	Aug. 10	78	19.82	0.963	18-22	20	0.014	-0.567	0.189
	Aug. 12	104	19.53	0.994	17-22	20	-0.048	-0.012	0.198
	Aug. 17	92	20.03	0.857	18-21	20	-0.705	0.019	0.267
	Sept. 3	50	22.22	0.864	20-24	23	-0.451	-0.532	0.853
	Sept. 7	76	23.21	1.225	20-26	23	-0.058	-0.72	0.173

Table 4. Summary of some descriptive statistics for individual daily female short-finned squid length frequency distributions from Newfoundland inshore localities. Only values of D or W in parentheses are not significant at the 0.05 probability level.

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1965	Sept. 3	85	22.53	1.428	18-27	23	-0.300	1.557	0.179
	Sept. 20	14	23.57	1.089	22-26	23	1.037	0.515	(0.82)
	Sept. 21	11	23.55	1.508	21-26	24	-0.106	-0.655	(0.97)
	Oct. 18	21	26.76	1.091	25-29	26	0.267	-0.705	(0.91)
	Oct. 20	66	26.33	1.783	22-29	27, 29	-0.322	-0.278	0.130
	Oct. 22	22	26.27	1.638	23-29	27	-0.555	-0.317	(0.93)
	Nov. 13	152	26.50	1.586	22-33	26	0.530	1.406	0.157
1966	July 20	145	18.96	1.433	15-23	18, 20	0.116	-0.137	0.162
	July 29	211	18.02	1.781	14-23	17, 19	0.293	-0.691	0.176
	Aug. 4	185	18.30	1.887	14-23	17	0.350	-0.590	0.155
	Aug. 10	113	21.05	2.150	16-25	18, 21, 23	-0.416	-0.238	0.118
	Aug. 12	122	20.35	2.249	16-25	17, 22	-0.428	-0.911	0.203
	Aug. 18	86	21.33	2.277	16-26	20, 22	-0.456	-0.543	0.186
	Aug. 25	159	22.15	1.829	17-27	18, 22	-0.113	0.538	0.152
	Sept. 1	119	22.94	2.226	18-27	19, 24	-0.277	-0.289	0.117
	Sept. 9	118	23.03	2.375	17-28	20, 24	-0.446	-0.593	0.183
	Sept. 16	131	22.93	2.655	18-29	21, 24	0.068	-1.041	0.132
	Sept. 22	48	23.25	2.168	20-28	22, 26	0.251	-1.114	(0.92)
	Sept. 23	92	21.62	2.021	17-28	21, 26	0.986	1.507	0.208
	Oct. 12	157	24.54	2.194	20-29	24, 26	0.078	-0.709	0.118
	Oct. 19	148	25.03	2.529	18-33	22.5, 26.5	0.197	0.072	0.099
	Oct. 26	81	23.83	1.916	19-29	24	0.034	0.214	0.103
	Nov. 2	169	22.18	2.058	17-28	22	0.891	0.926	0.216
1967	July 17	287	19.51	1.096	16-22	19	0.049	0.234	0.189
	July 26	206	20.83	1.299	17-24	21	-0.170	0.148	0.151
	Aug. 1	171	21.13	1.279	17-23	22	-0.733	0.461	0.195
	Aug. 8	194	21.79	1.571	18-26	22	0.063	0.081	0.141
	Aug. 14	181	22.57	1.633	17-27	22	-0.374	1.420	0.175
	Aug. 24	238	22.82	1.934	16-30	23	-0.418	1.381	0.146
	Sept. 1	222	22.76	2.368	16-30	24	-0.197	0.050	0.117
	Sept. 15	147	25.17	1.837	21-29	23, 25	-0.012	-0.484	0.143
	Sept. 19	203	25.60	1.917	21-32	26	0.046	-0.167	0.134
	Sept. 28	185	25.29	1.989	16-30	26, 20	-1.022	2.428	0.158
	Oct. 3	142	26.42	1.470	23-30	26	0.052	-0.237	0.141
	Oct. 18	131	27.82	1.498	25-32	28	0.416	0.190	0.176
	Oct. 23	182	27.57	1.473	23-31	28	-0.362	0.699	0.147
	Nov. 6	200	28.04	1.485	24-32	28, 31	0.507	0.323	0.184
	Nov. 15	173	27.88	1.450	23-32	28	-0.375	0.973	0.173
	Nov. 23	245	27.49	1.832	20-32	28	-0.974	2.088	0.191

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Table 4 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1971	July 6	444	18.31	1.572	15-23	18	0.286	-0.224	0.165
	July 12	281	19.12	1.482	16-23	19	0.215	-0.418	0.146
	July 19	403	19.23	1.590	15-24	18	0.349	-0.245	0.151
	July 28	72	20.29	1.756	17-27	20	1.081	2.252	0.190
	Aug. 3	217	20.49	1.552	15-25	21	0.213	0.728	0.140
	Aug. 10	200	21.55	1.206	18-26	22	0.072	0.309	0.190
	Aug. 18	228	21.88	1.209	17-25	22	-0.057	1.322	0.193
	Aug. 23	264	22.35	1.329	19-27	22	0.586	0.983	0.199
	Aug. 31	218	22.84	1.328	19-27	23	0.397	0.852	0.201
	Sept. 10	199	23.70	1.598	20-30	23	0.743	1.755	0.185
	Nov. 1	80	26.09	1.829	21-30	27	-0.870	1.112	0.203
	Nov. 10	140	26.38	1.593	23-31	26	0.582	0.567	0.172
1973	July 20	457	19.80	1.569	16-25	19, 21	0.319	-0.292	0.176
	Aug. 7	109	21.13	1.454	18-26	21	0.067	0.291	0.143
	Aug. 22	240	22.35	1.501	18-26	22	-0.209	-0.325	0.138
1975	Aug. 22	159	24.01	1.561	21-29	24	0.475	0.044	0.181
	Sept. 18	131	25.71	1.786	22-31	24	0.345	-0.281	0.145
	Oct. 29	212	26.24	1.471	22-31	26	0.442	0.656	0.178
1976	Aug. 31	132	25.26	1.963	21-31	25	0.000	0.240	0.146
	Sept. 27	157	27.08	1.656	22-31	27	-0.434	0.422	0.174
	Nov. 3	230	25.33	1.769	20-31	25	0.260	0.334	0.129
1977	July 25	9	20.11	1.965	17-24	19	0.565	1.337	(0.93)
	Aug. 1	30	22.30	2.184	18-28	20.5, 23	0.375	0.377	(0.96)
	Aug. 22	12	22.42	0.996	21-24	22	0.274	-0.654	(0.89)
	Aug. 29	7	25.29	2.628	22-29	23	0.030	-1.690	(0.91)
	Nov. 17	32	25.75	1.218	23-28	25	-0.057	-0.475	(0.93)
1978	July 12	83	17.58	1.083	15-21	18	0.442	0.636	0.191
	July 19	118	18.41	1.235	15-22	19	0.149	0.173	0.159
	July 27	103	19.60	1.623	15-25	19	0.235	0.768	0.159
	Aug. 1	120	21.10	1.552	17-25	21	-0.156	-0.195	0.140
	Aug. 22	123	20.91	1.355	17-26	20	0.647	1.203	0.189
	Aug. 29	74	21.19	1.372	19-27	21	1.383	3.840	0.203
	Sept. 8	118	22.52	1.723	19-28	22, 24	0.659	0.234	0.194
	Sept. 12	173	22.86	1.553	21-29	22	1.177	1.465	0.213

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Table 4 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
	Sept. 18	164	22.98	1.596	21-29	22	1.425	2.439	0.215
	Sept. 26	107	22.97	1.314	21-27	22	1.070	1.159	0.230
	Oct. 6	170	23.65	1.508	21-29	23	0.838	0.868	0.197
	Oct. 12	143	23.45	1.249	21-28	23	0.798	1.305	0.195
	Oct. 20	149	23.68	1.641	18-30	23	0.270	2.066	0.174
	Oct. 24	199	23.94	1.402	21-29	23	0.675	0.932	0.191
	Oct. 31	39	23.72	1.450	22-29	24	1.342	3.322	(0.87)
	Nov. 2	140	23.56	1.455	21-30	23	1.235	3.467	0.197
	Nov. 6	142	23.93	1.361	21-30	24	1.002	2.376	0.212
	Nov. 17	265	23.23	1.558	20-32	23	1.210	3.699	0.215
1979	July 2	88	18.72	1.523	16-23	19	0.516	0.321	0.199
	July 17	87	19.21	1.399	16-24	19	0.743	1.189	0.191
	Aug. 13	97	21.30	1.628	18-27	21	1.116	2.144	0.212
	Aug. 21	43	22.33	1.229	20-26	22, 25	1.110	1.585	(0.90)
	Aug. 22	55	22.38	1.521	20-27	22	1.020	1.652	0.199
	Sept. 6	102	23.90	1.486	21-27	24	1.486	-0.634	0.140
	Sept. 10	76	24.30	1.759	21-28	23, 25, 27	0.247	-1.108	0.20
	Sept. 12	57	24.25	1.766	21-29	24, 26	0.419	-0.189	0.169
	Sept. 28	154	24.79	1.714	22-31	24, 27	0.478	0.027	0.158
	Oct. 8	161	24.38	1.735	21-30	24	0.490	0.120	0.164
	Oct. 23	155	24.36	1.837	21-31	23.5, 27	0.587	0.228	0.152
	Nov. 20	183	24.83	1.378	22-30	25	0.462	0.964	0.205
1980	July 15	61	18.57	1.244	16-23	19	0.765	1.656	0.202
	Aug. 11	102	20.77	1.392	18-24	21	0.189	-0.355	0.151
	Aug. 22	100	21.32	1.469	18-25	21.5	0.148	-0.503	0.136
	Aug. 28	94	21.85	2.068	19-27	21, 23	0.956	-0.046	0.266
	Sept. 2	100	23.33	2.288	20-28	21, 23, 25	0.415	-0.884	0.147
	Sept. 7	102	23.54	2.033	19-29	22, 25	0.130	-0.548	0.146
	Sept. 17	96	23.82	1.741	20-28	23, 25	-0.149	-0.924	0.188
	Sept. 22	111	23.32	1.249	21-29	23	1.249	2.308	0.228
	Sept. 30	142	24.32	1.944	20-29	23, 25	0.196	-0.424	0.131
	Oct. 10	169	24.49	2.091	19-29	24	-0.106	-0.604	0.109
	Oct. 15	157	25.45	2.147	21-30	23, 26, 28	-0.040	-1.001	0.124

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Table 4 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Holyrood									
1981	July 15	152	19.00	1.003	16-22	19	0.518	1.319	0.263
	July 24	168	18.61	1.132	15-22	19	-0.031	0.488	0.183
	July 30	155	20.92	1.382	17-24	21	-0.357	0.623	0.163
	Aug. 11	113	19.86	1.068	17-23	20	0.198	0.985	0.235
	Aug. 18	155	20.70	1.637	17-24	20, 23	0.112	-0.476	0.155
	Aug. 26	163	19.87	0.818	18-22	20	0.242	-0.432	0.217
	Aug. 31	150	19.99	1.210	17-25	20	1.363	4.372	0.269
	Sept. 11	109	22.26	2.057	20-29	21, 26	1.631	2.625	0.247
1985	Aug. 14	362	19.68	1.384	14-24	20	-0.074	0.964	0.153
	19	337	20.60	1.385	15-25	21	-0.010	0.846	0.150
	28	267	21.63	1.563	16-26	22	-0.499	1.682	0.174
	Sept. 4	23	20.74	2.767	15-24	21	-0.662	-0.699	0.906
	5	144	19.65	3.181	15-27	19.5	0.139	-1.324	0.159
	6	9	19.00	3.317	15-25	18	0.819	-0.312	0.910
	12	195	22.63	2.153	17-27	23	-0.700	0.093	0.172
1988	Aug. 23	55	18.11	1.606	14-23	19	-0.573	1.426	0.147
	24	202	19.67	1.872	15-26	20	0.337	0.503	0.148
	25	11	18.54	1.695	14-20	19	1.695	5.625	0.742
	Sept. 5	58	20.50	1.838	16-25	20	0.026	0.186	0.142
	7	4	20.00	1.633	18-22	20	0.000	1.500	0.944
	15	4	20.50	1.291	19-22	20.5	0.000	-1.200	0.994
	18	194	21.86	1.723	17-29	22	0.181	1.655	0.125
	20	27	22.15	2.248	17-28	22	0.568	1.694	0.936
Twillingate									
1978	July 28	89	18.20	1.463	15-23	18	0.508	0.461	0.207
	Aug. 10	77	20.86	1.315	19-25	20	0.770	0.415	0.223
	Aug. 31	79	19.77	1.025	18-22	20	0.109	-0.602	0.192
	Sept. 6	51	23.25	1.831	19-28	23.5	0.461	0.498	0.166
	Sept. 7	63	17.94	1.343	15-22	18	0.780	1.018	0.227
	Sept. 15	61	22.38	1.562	20-28	22, 25	1.051	1.907	0.202
	Sept. 19	65	22.37	1.635	20-27	22, 25	1.236	1.174	0.251
	Sept. 27	46	22.85	1.229	21-26	22	0.679	0.360	(0.90)
	Sept. 28	112	22.29	1.485	19-27	22, 25	0.788	0.934	0.192

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Table 4 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Twillingate									
1979	Sept. 8	158	24.54	1.650	21-29	25	0.018	-0.279	0.123
	Sept. 15	108	24.23	1.853	20-29	23, 27	0.247	-0.442	0.135
	Sept. 22	69	24.30	1.448	22-28	24, 26	0.313	-0.578	0.206
	Sept. 29	81	24.52	1.831	20-30	24	0.345	0.897	0.153
	Oct. 5	129	24.80	1.612	20-32	24	1.174	4.096	0.186
1980	Aug. 5	163	20.69	1.214	18-24	21	0.190	0.180	0.179
	Aug. 14	66	21.29	1.714	19-24	21	0.119	-0.261	0.188
	Aug. 22	162	22.30	1.541	18-26	23	-0.066	0.092	0.131
	Aug. 30	117	22.50	1.304	10-27	22	0.323	0.142	0.163
	Sept. 12	130	23.55	1.359	21-27	23, 25	0.136	-0.480	0.179
	Oct. 11	161	23.85	1.927	17-30	23	0.198	1.023	0.161
1981	Aug. 8	161	20.99	2.054	17-27	20, 23	0.363	-0.177	0.145
	Aug. 12	141	20.77	1.729	17-25	21	1.729	-0.345	0.141
	Aug. 22	151	20.16	1.770	15-25	20	0.106	0.167	0.145
Harbour Breton									
1966	Aug. 3	188	18.24	1.669	15-22	18	0.115	-0.557	0.133
	Aug. 4	185	18.99	1.640	15-22	19	-0.133	-0.293	0.123
	Aug. 17	30	19.77	1.455	17-22	19, 21	-0.356	-0.579	(0.92)
	Sept. 13	244	22.77	2.224	18-27	24	-0.296	-0.770	0.149
	Sept. 26	39	26.33	2.756	20-32	26, 28	-0.685	0.310	(0.93)
	Sept. 29	178	20.47	1.500	17-25	20	0.161	0.014	0.140
	Oct. 22	286	21.52	1.930	17-27	21	0.530	0.069	0.151
	Oct. 24	66	20.48	1.610	17-25	20	0.439	0.189	0.163
	Oct. 26	196	20.82	2.167	16-27	19.5, 25	0.667	0.298	0.141
	Nov. 1	94	21.82	2.190	17-29	22, 25	0.751	0.884	0.169
1979	Aug. 20	89	22.58	1.321	19-25	23	-0.066	-0.433	0.163
	Aug. 22	82	22.56	1.406	20-26	23	0.091	-0.060	0.158
	Sept. 4	82	22.27	1.641	18-27	21.5, 24	0.174	-0.048	0.150
	Sept. 6	85	22.44	1.467	20-26	22	0.269	-0.632	0.158
	Sept. 7	88	22.60	1.685	19-26	23, 25	-0.011	-0.827	0.127
	Sept. 17	83	23.04	1.273	20-27	23	0.476	0.667	0.162
	Sept. 18	132	24.56	1.779	21-29	24, 26	-0.113	-0.568	0.132

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Table 4 (cont'd.)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Hermitage									
1978	July 31	431	19.73	1.711	16-25	19	0.258	0.031	0.137
	Aug. 31	339	22.22	1.700	18-28	22	0.434	-0.046	0.158
	Sept. 30	297	23.25	1.722	19-28	23	-0.007	-0.554	0.123
1979	Aug. 1	93	19.57	2.194	15-24	18, 22	0.264	-0.894	0.192
	Aug. 6	88	21.94	1.950	17-25	18, 23	-0.137	0.754	0.261
	Aug. 13	44	22.45	1.371	20-26	22.5	0.298	-0.030	(0.94)
	Aug. 20	41	22.34	1.217	20-25	22	0.083	-0.665	(0.93)
	Aug. 27	47	22.36	1.566	18-25	23	-0.849	0.932	(0.91)
	Oct. 1	202	23.25	1.554	19-29	22, 24	0.214	0.499	0.131
1981	July 24	236	20.83	1.374	16-24	21	-0.477	0.488	0.147
	Aug. 3	235	20.97	1.938	15-25	21	-0.519	0.170	0.157
	Aug. 11	207	21.61	1.470	17-26	22	-0.308	0.141	0.185
	Aug. 19	173	21.53	1.993	17-27	23	0.046	-0.501	0.116
	Aug. 26	164	23.02	1.966	18-29	24	0.064	-0.245	0.123
	Aug. 31	173	22.92	2.059	19-27	23.5	-0.104	-0.867	0.122
	Sept. 7	236	21.92	1.929	18-28	21, 25	0.640	-0.045	0.170
	Sept. 15	111	21.88	1.600	19-27	22	0.778	0.929	0.183
Recontre West									
1965	July 29	13	15.85	1.405	14-19	15	1.171	0.916	(0.85)
	Aug. 7	109	17.74	1.858	13-22	18, 20	0.093	-0.170	0.133
	Aug. 14	156	17.16	2.142	13-21	14, 16, 19, 21	0.048	-0.781	0.110
	Aug. 23	92	19.08	2.124	16-24	17, 19, 21	0.250	-0.833	0.144
	Aug. 30	12	17.42	1.832	15-21	17, 19	0.426	-0.393	(0.94)
1966	July 26	258	18.66	1.340	16-22	19	0.209	0.579	(0.93)
	Aug. 9	258	19.75	1.778	14-24	20	-0.505	0.566	0.165
	Aug. 24	227	19.67	2.160	15-25	17, 21	0.106	-0.946	0.141
	Sept. 8	206	18.20	2.125	14-26	18, 22	0.821	1.090	0.164
	Sept. 20	225	19.72	2.095	16-26	19, 24	0.973	0.931	0.198
	Sept. 21	158	19.94	1.413	17-26	20	0.882	2.596	0.210

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Table 4 (Cont'd)

Locality/ Year	Date	N	Mantle length (cm) Mean	S.D.	Range	Mode(s)	Skewness	Kurtosis	D or W
Recontre West									
1967	Aug. 7	273	17.95	1.342	14-22	18	0.404	0.216	0.180
	Aug. 14	346	17.15	1.467	14-22	17	0.691	0.573	0.211
	Aug. 23	286	18.77	1.345	12-27	19	0.513	6.920	0.193
	Aug. 28	190	19.12	1.396	15-23	19	0.372	0.381	0.219
	Sept. 4	337	19.05	1.396	16-24	18	0.515	0.334	0.187
	Sept. 13	242	22.23	1.465	18-27	22.5	0.112	0.520	0.147
	Sept. 18	522	22.02	1.448	17-26	22	-0.219	0.763	0.157
	Oct. 2	264	22.07	2.109	17-28	22	-0.068	-0.652	0.109
	Oct. 9	247	23.44	2.237	18-28	19, 24	-0.590	-0.251	0.178
	Oct. 16	181	22.13	2.930	17-29	19, 25	0.155	-0.958	0.109
La Scie									
1965	Aug. 11	109	22.04	1.381	20-27	22	0.623	0.565	0.171
	Aug. 17	111	21.83	1.495	17-26	22	0.149	1.376	0.184
	Aug. 24	106	22.89	1.799	16-27	22	-0.612	1.819	0.129
	Sept. 1	101	22.28	1.644	18-26	22	-0.429	0.398	0.166
	Sept. 14	115	21.17	2.559	16-27	19, 22	0.078	-0.019	0.159
1980	Aug. 29	239	22.43	1.509	18-26	22.25	0.178	-0.548	0.151
	Sept. 9	217	22.47	1.273	19-26	22.75	0.486	0.592	0.209
	Sept. 16	240	22.80	1.357	18-27	22.75	0.328	0.534	0.168
	Sept. 21	60	22.78	1.485	19-26	22	-0.031	0.569	0.166
	Sept. 26	174	22.84	1.325	18-27	22.75	0.239	0.980	0.187
1981	Sept. 9	172	20.77	1.191	21-26	22.25	0.544	2.808	0.231
	Sept. 14	225	22.01	1.371	19-29	21.25	1.077	3.212	0.210
	Oct. 1	169	21.12	1.773	17-26	20	0.224	0.244	0.139
1982	Aug. 6	241	19.97	1.169	16-23	19.75	0.096	0.579	0.215
	Aug. 10	86	20.58	1.426	18-25	20	0.928	1.191	0.199
	Aug. 12	76	20.37	1.315	18-23	21	0.149	-0.359	0.158
	Aug. 17	104	20.50	1.428	17-23	20	0.204	-0.389	0.156
	Sept. 3	44	23.25	1.296	21-27	23	0.650	0.658	0.910
	Sept. 7	74	24.41	1.858	19-29	21, 25	0.243	0.606	0.134

Table 5. Regression parameters and goodness of fit for quadratic equations describing squid size data, by area, year and sex. Equations are of the form $L_t = B_0 + B_1 t + B_2 t^2$. Only parameters in parentheses did not differ significantly from zero ($P < 0.05$, Students's t-test). All F statistics were significant at that level.

Locality Year	Sex	N	Regression parameters B_0	B_1	B_2	r^2	F	C.V.
Holyrood								
1965	M	391	-35.034	0.383	-0.0006	0.48	182.09	4.62
	F	371	-68.839	0.614	-0.0010	0.54	215.99	6.17
1966	M	2220	-37.646	0.424	-0.0007	0.45	911.76	8.88
	F	2084	-51.301	0.530	-0.0009	0.44	817.20	10.63
1967	M	3448	-11.085	0.217	-0.0003	0.71	4268.07	5.68
	F	3107	-16.913	0.254	-0.0004	0.73	4171.57	7.15
1971	M	2779	-10.842	0.213	-0.0003	0.67	2798.14	6.36
	F	2746	-8.540	0.191	-0.0003	0.70	3240.58	7.10
1973	M	675	(49.167)	(-0.357)	(0.0010)	0.51	347.89	6.58
	F	806	(15.037)	(-0.022)	(0.0002)	0.36	221.87	7.39
1975	M	555	(-6.530)	0.205	-0.0003	0.26	95.09	4.48
	F	502	-36.292	0.432	-0.0007	0.27	93.71	6.25
1976	M	395	-72.214	0.698	-0.0013	0.22	55.21	4.30
	F	530	-110.080	0.993	-0.0018	0.17	54.74	6.94
1977	M	130	(2.095)	0.128	-0.0002	0.41	43.49	5.17
	F	90	(-24.339)	0.336	-0.0006	0.48	42.28	612.22
1978	M	2217	-17.567	0.272	-0.0005	0.64	1971.41	5.36
	F	2430	-22.425	0.309	-0.0005	0.55	1502.43	6.74
1979	M	1435	-9.316	0.212	-0.0003	0.68	1539.60	5.48
	F	1258	-17.222	0.277	-0.0005	0.58	872.20	7.15
1980	M	1082	-12.814	0.232	-0.0004	0.58	734.50	5.28
	F	1235	-12.170	0.212	-0.0003	0.43	475.80	8.30

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Table 5 (Cont'd.)

Year	Sex	N	Regression parameters B_0	B_1	B_2	r^2	F	C.V.
1981	M	2130	15.456	(0.009)	(0.0000)	0.13	160.99	5.88
	F	2133	(13.740)	(0.028)	(0.0000)	0.05	55.57	10.81
1985	M	1261	37.09	-0.20	0.0005	0.10	70.19	8.55
	F	1337	-19.21	0.26	-0.0004	0.11	86.00	9.71
1988	M	608	153.11	-1.14	0.0024	0.25	99.92	7.38
	F	555	74.27	-0.52	0.0012	0.27	104.79	8.80
Twillingate								
1978	M	505	48.282	-0.301	0.0007	0.35	132.26	8.49
	F	643	23.009	-0.082	0.0003	0.29	135.76	9.43
1979	M	482	233.81	-1.608	0.0031	0.05	12.02	4.80
	F	545	175.85	-1.157	0.0002	0.01	3.78	6.88
1980	M	588	-22.561	0.319	-0.0006	0.34	147.58	5.12
	F	1028	-40.753	0.461	-0.0008	0.38	273.31	6.65
1981	M	540	496.72	-4.182	0.0092	0.01	3.23	8.13
	F	731	664.584	-5.612	0.0122	0.05	18.67	8.79
Harbour Breton								
1966	M	934	-58.444	0.597	-0.0011	0.31	213.66	8.44
	F	1509	-68.761	0.677	-0.0013	0.27	284.25	10.44
1979	M	232	(31.048)	(-0.127)	(0.0003)	0.26	40.26	5.65
	F	823	27.432	(-0.097)	(0.0003)	0.29	165.91	6.89
Hermitage								
1978	M	335	-49.395	0.529	-0.0010	0.59	238.14	5.58
	F	1067	-34.165	0.409	-0.0007	0.44	420.26	7.81
1979	M	492	-47.178	0.519	-0.0010	0.35	129.27	6.85
	F	1246	-73.689	0.749	-0.0014	0.29	252.72	7.45
1981	M	995	(-16.062)	0.269	-0.0005	0.21	129.78	6.61
	F	2291	(-10.626)	0.251	-0.0005	0.11	143.57	8.17

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Table 5 (Cont'd.)

Year	Sex	N	Regression parameters B_0	B_1	B_2	r^2	F	C.V.
Recontre West								
1965	M	340	-327.480	2.970	-0.0064	0.10	18.32	11.86
	F	382	(25.628)	(-0.144)	(0.0005)	0.06	11.92	11.97
1966	M	870	60.319	-0.357	0.0008	0.02	10.41	9.12
	F	1126	55.677	-0.303	0.0006	0.01	3.84	10.41
1967	M	2409	-49.122	0.471	-0.0008	0.52	1282.21	7.98
	F	2888	-48.223	0.455	-0.0007	0.52	1567.19	9.19
La Scie								
1965	M	-	-	-	-	-	-	-
	F	542	-167.922	1.606	-0.0034	0.07	18.23	8.42
1980	M	629	49.445	-0.233	0.0005	0.02	5.56	4.51
	F	930	22.745	-0.018	0.0000	0.01	6.80	6.11
1981	M	492	-833.884	6.505	-0.0124	0.16	45.30	5.70
	F	566	-929.518	7.224	-0.0137	0.12	39.14	6.81
1982	M	344	175.453	-1.439	0.0033	0.68	358.15	5.13
	F	625	193.132	-1.603	0.0037	0.54	365.57	6.59

Table 6 Results of analysis of covariance, testing for yearly differences in quadratic equations by area for male short-finned squid.

Area / Years compared	Test of parallel regression SS	df	F	P	Test of common intercept SS	df	F	P
Holyrood								
1965-1966	180.80	2	29.28	0.0001				
-1967	9.33	2	2.94	0.0529	143.69	1	90.43	0.0001
-1971	14.62	2	4.63	0.0098				
-1973	15.99	2	5.21	0.0056				
-1975	88.72	2	39.37	0.0001				
-1976	324.34	2	152.07	0.0001				
-1977	42.12	2	17.81	0.0001				
-1978	153.99	2	61.42	0.0001				
-1979	93.09	2	34.75	0.0001				
-1980	42.61	2	18.46	0.0001				
-1981	50.26	2	19.67	0.0001				
1966-1967	358.68	2	76.84	0.0001				
-1971	254.27	2	52.34	0.0001				
-1973	31.06	2	5.12	0.0060				
-1975	25.72	2	4.35	0.0130				
-1976	54.69	2	8.96	0.0001				
-1977	44.89	2	6.80	0.0001				
-1978	220.85	2	47.08	0.0001				
-1979	378.32	2	72.13	0.0001				
-1980	210.60	2	39.33	0.0001				
-1981	1159.62	2	243.48	0.0001				
1967-1971	24.94	2	7.63	0.0001				
-1973	30.15	2	9.13	0.0001				
-1975	200.89	2	64.43	0.0001				
-1976	511.58	2	163.40	0.0001				
-1977	54.86	2	16.95	0.0001				
-1978	713.38	2	239.33	0.0001				
-1979	496.15	2	159.00	0.0001				
-1980	119.00	2	39.21	0.0001				
-1981	856.23	2	284.48	0.0001				

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Table 6 (Cont'd.)

Area / Years compared	Test of parallel regression SS	df	F	P	Test of common intercept SS	df	F	P
1971-1973	47.20	2	14.25	0.0001				
-1975	101.82	2	32.94	0.0001				
-1976	331.66	2	106.80	0.0001				
-1977	32.95	2	10.19	0.0001				
-1978	199.24	2	67.67	0.0001				
-1979	198.51	2	64.04	0.0001				
-1980	62.89	2	20.98	0.0001				
-1981	854.03	2	286.89	0.0001				
1973-1975	28.00	2	9.67	0.0001				
-1976	34.08	2	11.71	0.0001				
-1977	40.79	2	12.32	0.0001				
-1978	53.13	2	19.28	0.0001				
-1979	108.05	2	36.07	0.0001				
-1980	67.78	2	24.66	0.0001				
-1981	469.23	2	167.21	0.0001				
1975-1976	64.16	2	30.87	0.0001				
-1977	2.78	2	1.25	0.2872	55.28	1	49.67	0.0001
-1978	3.72	2	1.51	0.2211	1500.48	1	1217.29	0.0001
-1979	6.94	2	2.67	0.0695	558.36	1	428.05	0.0001
-1980	2.55	2	1.13	0.3233	1431.99	1	1269.55	0.0001
-1981	12.88	2	5.14	0.0059				
1976-1977	71.99	2	35.20	0.0001				
-1978	120.31	2	49.23	0.0001				
-1979	164.89	2	63.74	0.0001				
-1980	63.69	2	29.01	0.0001				
-1981	80.58	2	32.37	0.0001				
1977-1978	10.58	2	4.19	0.0153				
-1979	4.02	2	1.47	0.2302	22.02	1	16.08	0.0001
-1980	5.58	2	2.42	0.0894	208.98	1	181.00	0.0001
-1981	5.52	2	2.14	0.1179	291.80	1	225.83	0.0001

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Table 6. (Cont'd.)

Area / Years compared	Test of parallel regression SS	df	F	P	Test of common intercept SS	df	F	P
1978-1979	31.68	2	12.07	0.0001				
-1980	6.24	2	2.54	0.0790	30.09	1	24.49	0.0001
-1981	558.27	2	217.83	0.0001				
1979-1980	2.20	2	0.86	0.4233	436.82	1	340.92	0.0001
-1981	388.36	2	145.86	0.0001				
1980-1981	259.63	2	104.21	0.0001				
Twillingate								
1978-1979	159.36	2	39.53	0.0001				
-1980	131.70	2	34.19	0.0001				
-1981	51.78	2	9.53	0.0001				
1979-1980	41.66	2	17.72	0.0001				
-1981	33.42	2	8.58	0.0001				
1980-1981	85.88	2	23.00	0.0001				
Hermitage								
1978-1979	1.48	2	0.45	0.6378	65.95	1	40.46	0.0001
-1981	33.59	2	10.00	0.0001				
1979-1981	21.01	2	5.60	0.0038				
Rencontre West								
1965-1966	174.44	2	25.51	0.0001				
-1967	79.39	2	14.83	0.0001				
1966-1967	1269.94	2	248.69	0.0001				
Harbour Breton								
1966-1979	102.18	2	20.34	0.0001				

Table 7. Results of analysis of covariance, testing for yearly differences in quadratic equations, by area, for female short-finned squid.

Area / Years compared	Test of parrallel regression SS	df	F	P	Test of common intercept SS	df	F	P
Holyrood								
1965-1966	552.14	2	57.08	0.0001				
-1967	45.19	2	7.64	0.0005				
-1971	74.25	2	16.40	0.0001				
-1973	68.54	2	14.39	0.0001				
-1975	269.91	2	54.25	0.0001				
-1976	895.54	2	154.58	0.0001				
-1977	164.96	2	30.99	0.0001				
-1978	425.90	2	92.06	0.0001				
-1979	340.49	2	63.06	0.0001				
-1980	60.63	2	8.86	0.0001				
-1981	152.34	2	17.44	0.0001				
1966-1967	1116.50	2	142.49	0.0001				
-1971	666.40	2	94.08	0.0001				
-1973	243.92	2	74.89	0.0001				
-1975	10.98	2	1.16	0.3137	2529.55	1	534.86	0.0001
-1976	113.76	2	11.74	0.0001				
-1977	17.41	2	1.67	0.1885	603.82	1	116.24	0.0001
-1978	299.82	2	40.94	0.0001				
-1979	365.23	2	42.23	0.0001				
-1980	231.03	2	24.66	0.0001				
-1981	1653.82	2	166.16	0.0001				
1967-1971	227.93	2	42.96	0.0001				
-1973	72.22	2	12.53	0.0001				
-1975	401.14	2	68.01	0.0001				
-1976	1455.01	2	238.81	0.0001				
-1977	162.23	2	26.74	0.0001				
-1978	1910.11	2	353.72	0.0001				
-1979	1197.12	2	203.03	0.0001				
-1980	36.85	2	5.73	0.0033				
-1981	1582.55	2	3.70	0.0248				

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Table 7 (Cont'd.)

Area / Years compared	Test of parrallel regression SS	df	F	P	Test of common intercept SS	df	F	P
Holyrood								
1971-1973	3.97	2	0.87	0.4190	17.42	1	7.69	0.0056
-1975	206.15	2	45.18	0.0001				
-1976	1024.54	2	213.88	0.0001				
-1977	80.48	2	17.65	0.0001				
-1978	540.48	2	119.37	0.0001				
-1979	376.87	2	78.30	0.0001				
-1980	9.40	2	1.74	0.1757	142.35	1	52.78	0.0001
-1981	1050.27	2	158.43	0.0001				
1973-1975	12.90	2	2.67	0.0696	362.52	1	149.72	0.0001
-1976	130.58	2	24.26	0.0001				
-1977	4.33	2	0.88	0.4151	62.19	1	25.18	0.0001
-1978	10.30	2	2.23	0.1077	305.78	1	132.43	0.0001
-1979	3.78	2	0.72	0.4869	24.59	1	9.43	0.0022
-1980	8.52	2	1.34	0.2621	117.34	1	36.93	0.0001
-1981	280.42	2	34.56	0.0001				
1975-1976	98.63	2	17.16	0.0001				
-1977	2.48	2	0.46	0.6315	1.14	1	0.43	0.5141
-1978	6.05	2	1.30	0.2727	2685.58	1	1151.86	0.0001
-1979	9.68	2	1.79	0.1673	723.99	1	267.82	0.0001
-1980	120.84	2	17.93	0.0001				
-1981	62.90	2	7.34	0.0006				
1976-1977	87.95	2	13.48	0.0001				
-1978	375.52	2	76.43	0.0001				
-1979	412.58	2	71.06	0.0001				
-1980	465.37	2	65.30	0.0001				
-1981	243.04	2	27.59	0.0001				

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Table 7 (Cont'd.)

Area / Years compared	Test of parrallel regression SS	df	F	P	Test of common intercept SS	df	F	P
Holyrood								
1977-1978	3.46	2	0.74	0.4772	369.07	1	157.97	0.0001
-1979	1.89	2	0.33	0.7190	63.05	1	22.34	0.0001
-1980	65.50	2	8.84	0.0001				
-1981	26.64	2	2.86	0.0575	326.45	1	70.00	0.0001
1978-1979	9.52	2	1.94	0.1439	1107.87	1	450.74	0.0001
-1980	244.74	2	44.16	0.0001				
-1981	778.34	2	113.86	0.0001				
1979-1980	217.56	2	33.58	0.0001				
-1981	636.92	2	79.89	0.0001				
1980-1981	390.02	2	44.94	0.0001				
Twillingate								
1978-1979	113.26	2	16.58	0.0001				
-1980	80.05	2	13.87	0.0001				
-1981	278.72	2	38.65	0.0001				
1979-1980	41.63	2	8.48	0.0002				
-1981	34.00	2	5.43	0.0045				
1980-1981	432.80	2	79.98	0.0001				
Hermitage								
1978-1979	59.49	2	10.24	0.0001				
-1981	377.82	2	59.94	0.0001				
1979-1981	332.32	2	53.15	0.0001				

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Table 7 (Cont'd.)

Area / Years compared	Test of parrallel regression SS	df	F	P	Test of common intercept SS	df	F	P
Rencontre West								
1965-1966	133.74	2	15.93	0.0001				
-1967	51.27	2	7.09	0.0008				
1966-1967	2592.92	2	353.84	0.0001				
Harbour Breton								
1966-1969	238.86	2	30.36	0.0001				

Table 8. Summary of sex composition for all Newfoundland inshore daily short-finned squid samples.

Locality Year	Month	Day	N	No. males	Percent males	Year	Locality Month	Day	N	No. males	Percent males
Holyrood											
1965	Sept.	3	186	101	54		Nov.	6	348	148	43
		20	40	26	65			15	378	205	54
		21	30	19	63			23	486	241	50
	Oct.	18	36	15	42						
		20	143	77	54	1971	July	6	866	422	49
		22	37	15	41			12	625	344	55
	Nov.	13	290	138	48			19	730	327	45
								28	143	71	50
1966	July	20	323	178	55		Aug.	3	504	287	57
		29	407	196	48			10	411	211	51
	Aug.	4	376	191	51			18	478	250	52
		10	232	119	51			23	525	261	50
		12	148	126	51			31	459	241	53
		18	177	91	51		Sept.	10	395	196	50
		25	301	142	47		Nov.	1	140	60	43
	Sept.	1	269	150	56			10	249	109	44
		9	269	151	56						
		16	273	142	52	1973	July	20	809	352	44
		22	151	103	68		Aug.	7	199	90	45
		23	232	140	60			22	473	233	49
	Oct.	12	280	123	44						
		19	294	146	50	1975	Aug.	22	379	220	58
		26	170	89	52		Sept.	18	295	164	56
	Nov.	2	302	133	44		Oct.	29	383	171	45
1967	July	17	584	297	51	1976	Aug.	31	320	177	55
		26	464	258	56		Sept.	27	240	83	35
	Aug.	1	444	273	61		Nov.	3	365	135	37
		8	452	258	57						
		14	397	216	54	1977	July	25	31	22	71
		24	509	271	53		Aug.	1	75	45	60
	Sept.	1	470	248	53			22	49	37	76
		15	272	125	46			29	19	12	63
		19	404	201	50		Nov.	17	46	14	30
		28	406	221	54						
	Oct.	3	241	99	41	1978	July	12	198	115	58
		18	332	201	61			19	170	152	56
		23	368	186	51			27	243	140	58

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Table 8 (Cont'd)

Locality Year	Month	Day	N	No. males	Percent males	Year	Locality Month	Day	N	No. males	Percent males
Holyrood											
1978	Aug.	1	249	129	52	1981	July	15	565	301	53
		22	267	144	54			24	569	292	51
		29	135	61	45			30	455	170	37
	Sept.	8	222	104	47		Aug.	3	423	191	45
		12	324	151	47			11	508	296	58
		18	317	153	48			18	487	226	46
		26	211	104	49			26	488	247	51
	Oct.	6	298	128	43			31	552	300	54
		12	275	132	48		Sept.	11	216	107	50
		20	273	124	45						
		24	331	132	40	1982	July	23	800	445	56
		31	75	36	48		Aug.	3	854	436	49
	Nov.	2	249	109	44			19	781	389	50
		6	257	115	45			31	589	319	54
		17	453	188	42						
1979	July	2	251	163	65	1985	Aug.	14	683	321	47
		17	309	122	58			19	671	334	50
	Aug.	13	257	160	62			28	503	236	47
		21	103	60	58						
		22	157	102	65		Sept.	4	47	24	51
	Sept.	6	121	19	16			5	307	163	53
		10	118	42	36			6	21	12	57
		12	119	62	52			12	366	171	47
		28	331	177	53						
	Oct.	8	353	192	54						
		23	347	192	55	1988	Aug.	8	2	2	100
								23	97	42	43
								24	422	220	52
								25	26	15	58
1980	July	15	241	180	75						
		17	309	122	58		Sept.	5	111	58	52
	Aug.	11	333	231	69			7	8	4	50
		22	235	135	57			15	9	5	56
		28	221	127	57			18	430	236	55
	Sept.	2	185	85	46						
		7	177	75	42						
		17	155	59	38						
		22	175	64	37						
		30	183	40	22						
	Oct.	10	220	51	23						
		15	192	35	18						

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Table 8 (Cont'd)

Locality / Year	Month	Day	N	No. males	Percent males
Tvillingate					
1978	July	28	159	70	44
	Aug.	10	129	52	40
		31	134	55	41
	Sept.	6	95	44	46
		7	144	81	56
		15	102	41	40
		19	109	44	40
		27	99	53	54
		28	177	65	37
1979	Sept.	8	294	136	46
		15	221	113	51
		22	150	81	54
		29	145	64	44
	Oct.	5	217	88	41
1980	Aug.	5	271	108	40
		14	115	49	43
		22	319	94	29
		30	293	116	40
	Sept.	12	212	82	39
	Oct.	4	156	50	32
		15	192	35	18
1981	Aug.	8	449	154	34
		12	369	162	44
		22	453	224	49
Harbour Breton					
1966	Aug.	3	360	172	48
		4	301	116	39
		17	58	28	48
	Sept.	13	384	140	36
		26	65	26	40
		29	303	125	41
	Oct.	20	9	6	67
		22	417	131	31
		24	113	47	42
		26	289	93	32
	Nov.	1	144	50	35
1979	Aug.	20	106	17	16
		22	102	20	20
	Sept.	4	114	32	28
		6	116	31	27
		7	107	19	18
		17	96	13	14
		18	162	30	19
Hermitage					
1978	July	31	574	143	25
	Aug.	31	443	104	23
	Sept.	30	385	88	23
1979	Aug.	1	232	99	43
		6	201	64	32
		13	151	29	19
		20	204	47	23
		27	200	45	23
	Oct.	1	338	104	31
1981	July	24	505	59	11
	Aug.	3	536	94	18
		11	313	106	34
		19	429	174	41
		26	247	83	34
		31	395	127	32
	Sept.	7	406	170	42
		25	50	22	44
		15	395	160	41
Recontre West					
1965	July	29	22	9	41
	Aug.	7	230	121	53
		14	228	72	32
		23	207	115	56
		30	35	23	66
1966	July	26	97	50	52
		27	7	2	29
	Aug.	9	391	133	34
		24	387	160	41

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Table 8 (Cont'd)

Locality Year	Month	Day	N	No. males	Percent males
Recontre West					
	Sept.	8	401	195	49
		20	405	180	44
		21	308	150	49
1967	Aug.	7	477	204	43
		14	624	278	45
		23	552	266	48
		28	328	138	42
	Sept.	4	566	229	40
		13	499	257	52
		18	986	464	47
	Oct.	2	493	229	476
		9	416	169	41
		16	356	175	49
La Scie					
1965	Aug.	11	200	91	46
		17	200	89	45
		24	200	94	47
	Sept.	1	200	99	50
		14	205	90	45
1980	Aug.	29	393	154	39
	Sept.	9	398	181	45
		16	401	161	40
		21	89	29	33
		26	278	104	37
1981	Sept.	9	333	161	48
		14	424	197	47
	Oct.	1	333	134	44
1982	Aug.	6	446	205	46
		10	164	78	48
		12	180	104	58
		17	196	92	47
	Sept.	3	94	50	53
		7	150	76	51

Table 9. Summary of results of probit analysis, with regression parameters and goodness of fit of probit equations by locality, year and month for male maturity Class I (stage 1).

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
Holyrood							
1966	July	All immature					
	Aug.	22.56	22.42-22.75	-1.27	33.57	7.23	0.78
	Sept.	21.78	21.66-21.89	-1.35	34.34	1.58	0.99
	Oct.	21.77	21.56-21.94	-1.23	31.73	4.79	0.78
	Nov.	21.91	21.64-22.22	-1.11	29.26	1.19	0.98
1967	Aug.	22.14	22.01-22.27	-0.85	23.88	4.38	0.93
	Sept.	21.43	21.20-21.61	-0.85	23.12	0.70	1.00
	Oct.	None immature					
	Nov.	21.13	19.15-21.71	-1.42	34.90	0.66	0.10
1971	Aug.	22.66	22.52-22.83	-0.88	24.91	10.76	0.38
	Sept.	21.77	21.44-22.01	-0.88	24.25	0.90	0.92
	Nov.	None immature					
1973	July	22.74	21.92-25.23	-0.80	23.25	0.67	0.10
	Aug.	21.84	21.63-22.07	-0.79	22.27	7.73	0.36
1975	Aug.	21.88	21.63-22.08	-1.14	29.83	7.58	0.18
	Sept.	20.88	18.34-21.67	-0.74	20.52	0.61	0.99
1976	Aug.	21.49	21.08-21.76	-1.02	26.88	0.63	0.96
	Sept.	None immature					
	Nov.	Insufficient data					
1977	Aug.	21.89	21.67-22.14	-1.74	43.04	5.87	0.32
1978	July	All immature					
	Aug.	All immature					
	Sept.	23.66	22.84-26.57	-0.44	15.44	13.52	0.02
	Oct.	19.78	16.46-20.73	-0.39	12.68	1.31	0.73
	Nov.	18.18	13.58-19.54	-0.27	9.86	8.51	0.20
1979	July	All immature					
	Aug.	23.00	22.64-23.60	-0.90	25.74	6.50	0.37
	Sept.	23.15	22.73-23.73	-0.67	20.50	12.43	0.05
	Oct.	21.84	21.54-22.07	-0.61	18.31	3.43	0.75
	Nov.	20.70	17.95-21.47	-0.63	17.94	1.54	0.82

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Table 9. (Cont'd.)

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
1980	July	All immature					
	Aug.	23.78	23.15-25.06	-0.84	25.03	3.81	0.87
	Sept.	23.31	22.99-23.82	-0.97	27.66	0.49	0.10
	Oct.	23.12	22.66-24.09	-0.87	25.14	0.16	0.10
1981	July	Insufficient data					
	Aug.	21.45	20.83-22.82	-0.38	13.23	18.67	0.01
	Sept.	23.69	22.87-26.58	0.78	23.56	1.86	0.93
1985	Sept.	24.20	23.70-25.31	-0.72	22.48	1.84	0.99
1988	Aug.	22.68	22.26-23.42	-1.06	29.09	8.98	0.34
	Sept.	19.85	19.64-20.03	-1.05	25.80	8.57	0.38
Twillingate							
1978	July	All immature					
	Aug.	21.21	20.49-23.42	-0.51	15.80	0.56	0.99
	Sept.	18.95	18.35-19.42	-0.38	12.14	6.44	0.49
1979	Sept.	23.10	22.89-23.37	-1.05	29.16	0.96	0.92
	Oct.	21.55	16.27-22.40	-0.39	13.45	1.69	0.79
1980	Aug.	23.21	22.61-24.36	-0.51	16.73	4.16	0.76
	Sept.	22.23	21.29-27.10	-0.33	12.32	1.56	0.82
	Oct.	22.47	22.05-23.05	-0.53	16.91	3.03	0.69
Hermitage							
1978	July	Insufficient data					
	Aug.	20.39	20.06-20.71	-0.92	23.71	1.16	0.88
	Sept.	20.31	19.56-20.71	-0.72	19.66	0.41	0.94
1979	Aug.	All immature					
	Oct.	23.00	22.42-24.72	-0.70	21.18	3.97	0.26
1981	July	All immature					
	Aug.	24.00	23.47-25.16	-0.96	27.98	2.69	0.95
	Sept.	23.16	22.73-23.99	-0.88	25.46	0.82	0.99

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Table 9. (Cont'd.)

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
Harbour Breton							
1966	Sept.	21.03	20.77-21.31	-0.78	21.34	10.47	0.23
	Oct.	20.02	19.79-20.26	-0.94	23.77	1.85	0.97
	Nov.	20.20	19.77-20.79	-1.49	35.01	1.41	0.97
1979	Aug.	All immature					
	Sept.	23.05	22.59-23.89	-0.84	24.40	1.59	0.90
Rencontre West							
1966	Aug.	22.30	21.73-23.70	-0.89	24.87	1.98	0.96
	Sept.	19.14	18.96-19.33	-0.81	20.46	9.34	0.41
1967	Aug.	21.76	21.00-23.19	-0.56	17.07	11.22	0.13
	Sept.	19.94	19.76-20.12	-0.50	15.21	5.87	0.66
	Oct.	19.40	19.13-19.63	-0.64	17.43	3.34	0.95
La Scie							
1965	Insufficient data						
1980	Sept.	24.50	23.50-27.19	-0.33	13.01	0.52	0.99
1981	Sept.	23.43	22.69-25.03	-0.34	12.91	5.16	0.52
	Oct.	25.45	23.12-51.04	-0.22	10.52	6.70	0.46
1982	Aug.	19.27	18.98-19.51	-0.72	18.83	4.43	0.35

Table 10. Summary of results of probit analysis, with regression parameters and goodness of fit of probit equations by locality, year and month for male maturity Class II (stage 1+2).

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line χ^2	Fit of line P
Holyrood							
1966	July	All immature					
	Aug.	All immature					
	Sept.	24.01	23.83-24.24	-0.92	27.05	8.03	0.43
	Oct.	24.01	23.86-24.18	-1.26	35.25	0.81	0.10
	Nov.	23.94	23.42-25.08	-0.88	26.11	1.87	0.93
1967	July	All immature					
	Sept.	23.09	22.95-23.22	-0.84	24.36	8.35	0.59
	Oct.	22.01	2.80-23.04	-0.85	23.80	31.85	0.00
	Nov.	21.66	20.68-22.16	-1.04	27.56	4.19	0.84
1971	July	All immature					
	Aug.	25.23	24.50-26.72	-0.72	23.20	1.21	0.10
	Sept.	23.69	23.32-24.36	-0.75	22.73	0.67	0.96
	Oct.	No data					
	Nov.	21.33	19.90-21.92	-0.90	24.18	1.60	0.81
1973	July	All immature					
	Aug.	25.03	24.19-27.21	-0.60	19.93	1.37	0.99
	No data for other months						
1975	July	No data					
	Aug.	23.90	23.63-24.30	-1.01	29.18	3.83	0.57
	Sept.	22.87	22.52-23.11	-0.99	27.52	0.57	0.97
	Oct.	20.71	14.17-22.00	-0.44	14.09	1.29	0.73
	Nov.	No data					
1976	July	No data					
	Aug.	23.11	22.61-23.96	-1.16	31.84	11.09	0.03
	Sept.	22.38	21.24-22.69	-1.93	48.17	0.05	0.10
	Oct.	No data					
	Nov.	No data					
1977	July	No data					
	Aug.	22.78	22.47-23.66	-1.98	50.06	0.01	1.00
	Sept.	No data					
	Oct.	No data					
	Nov.	All mature					

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Table 10. (Cont'd.)

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
1978	July	All immature					
	Aug.	All immature					
	Sept.	25.15	24.44-26.59	-0.66	21.70	4.63	0.46
	Oct.	23.74	23.42-24.27	-0.77	23.26	3.50	0.32
	Nov.	23.91	23.33-25.15	-0.37	13.92	2.67	0.85
1979	July	All immature					
	Aug.	25.31	23.82-42.32	-0.56	19.09	3.60	0.61
	Sept.	24.95	23.93-36.33	-0.65	21.21	29.79	0.00
	Oct.	24.58	24.25-25.07	-0.77	23.99	1.05	0.98
	Nov.	23.60	23.16-24.29	-0.50	16.68	1.00	0.96
1980	July	All immature					
	Aug.	All immature					
	Sept.	Data not analyzed					
	Oct.	23.67	23.18-24.83	-1.13	31.83	.70	0.95
	Nov.	No data					
1981	July	All immature					
	Aug.	All immature					
	Sept.	No data analyzed					
	Oct.	No data					
	Nov.	No data					
1985	Aug.	Insufficient data					
	Sept.	26.10	24.58-37.68	-0.57	19.81	2.26	0.99
1988	Aug.	Insufficient data					
	Sept.	21.95	21.63-22.40	-0.98	26.64	15.98	0.04
Tvillingate							
1978	July	All immature					
	Aug.	All immature					
	Sept.	23.60	23.12-24.54	0.76	22.98	0.88	0.99
	Oct.	No data					
	Nov.	No data					

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Table 10. (Cont'd.)

Locality / Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line χ^2	Fit of line P
1979	July	No data					
	Aug.	No data					
	Sept.	23.22	22.96-23.53	-0.55	17.78	3.84	0.57
	Oct.	24.72	23.93-28.92	-0.46	16.30	2.86	0.58
	Nov.	No data					
Hermitage							
1978	July	All immature					
	Aug.	All immature					
	Sept.	24.14	22.75-230.38	-0.66	20.82	0.12	0.99
	Oct.	No data					
	Nov.	No data					
Harbor Breton							
1966	July	No data					
	Aug.	No data					
	Sept.	23.86	23.56-24.24	-1.00	28.87	6.72	0.57
	Oct.	22.40	21.89-23.31	-0.70	20.77	7.00	0.43
	Nov.	21.69	21.13-22.43	-0.98	26.20	1.53	0.96
1979	July	No data					
	Aug.	All immature					
	Sept.	No data					
	Oct.	No data					
	Nov.	No data					
Rencontre West							
1966	July	All Immature					
	Aug.	All Immatuare					
	Sept.	23.09	22.62-23.89	-0.89	25.49	1.81	0.99
	Oct.	No data					
	Nov.	No data					
1967	July	No data					
	Aug.	All Immature					
	Sept.	22.47	22.29-22.71	-0.84	23.84	9.71	0.29
	Oct.	22.01	21.84-22.19	-0.83	23.18	5.28	0.81
	Nov.	No data					

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Table 10. (Cont'd).

Locality Time	Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
La Scie						
1965	Insufficient data					
1980	Insufficient data					
1981	Insufficient data					
1982	Sept. 22.62	21.75-22.40	-0.98	26.64	15.98	0.04

Table 11. Summary of results of probit analysis, with regression parameters and goodness of fit of probit equations by locality, year and month for male maturity. Class III (stage 4).

Locality Time		Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
Holyrood							
1966	July	All immature					
	Aug.	No data analyzed					
	Sept.	25.01	24.69-25.54	0.97	-19.23	0.28	1.00
	Oct.	24.69	24.51-24.92	1.17	-23.92	1.15	0.99
	Nov.	24.69	24.17-27.53	1.69	-36.77	0.10	1.00
1967	July	All immature					
	Aug.	None mature					
	Sept.	24.15	23.84-24.54	0.74	-12.74	33.02	0.00
	Oct.	22.69	22.15-23.05	0.77	-12.55	5.86	0.44
	Nov.	22.87	21.89-23.33	1.09	-20.00	21.52	0.01
1971	July	All immature					
	Aug.	25.44	24.62-27.49	0.82	-15.90	0.81	1.00
	Sept.	25.75	24.47-38.99	0.67	-12.30	1.57	0.67
	Oct.	No data					
	Nov.	21.97	20.93-22.49	0.68	-10.02	2.15	0.71
1973	July	No data analyzed					
	Aug.	No data analyzed					
		No data available for other months					
1975	July	No data					
	Aug.	25.83	24.92-34.92	0.97	-20.14	0.98	0.97
	Sept.	23.95	23.65-24.35	0.70	-11.78	2.24	0.82
	Oct.	23.02	22.37-23.39	0.65	-9.94	1.36	0.85
	Nov.	No data					
1976	July	No data					
	Aug.	24.13	23.81-24.69	1.06	-20.58	0.30	0.99
	Sept.	22.35	20.50-22.88	0.85	-13.93	1.01	0.80
	Oct.	No data					
	Nov.	No data analyzed					
1978	July	All immature					
	Aug.	All immature					
	Sept.	One mature					
	Oct.	24.58	24.08-25.78	0.95	-18.46	0.07	0.99
	Nov.	25.88	24.66-29.47	0.43	-6.13	5.43	0.49

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Table 11. (Cont'd.)

Locality Time	Length at M_{50}, cm	95% Fiducial limits	Slope	Intercept	Fit of line X^2	Fit of line P
1979 July	All immature					
Aug.	One mature					
Sept.	25.97	25.27-27.69	0.80	-15.78	0.72	0.99
Oct.	Insufficient data					
Nov.	24.72	24.19-25.93	0.66	-11.23	1.15	0.89
1980 July	All immature					
Aug.	None mature					
Sept.	None mature					
Oct.	24.73	23.89-28.99	0.93	-18.11	0.61	0.96
1985	Insufficient data					
1988 Aug.	Insufficient data					
Sept.	23.67	23.26-24.79	1.32	-26.27	0.02	1.00
Rencontre West						
1965 July	None mature					
Aug.	None mature					
Sept.	No data					
Oct.	No data					
Nov.	No data					
1966 July	None mature					
Aug.	None mature					
Sept.	24.50	23.85-28.12	1.31	-27.15	2.21	0.99
Oct.	No data					
Nov.	No data					
1967 July	No data					
Aug.	None mature					
Sept.	24.71	23.90-28.33	1.02	-20.17	2.09	0.98
Oct.	24.45	24.05-25.07	0.62	-10.06	5.82	0.67
Nov.	No data					
La Scie						
1965	Insufficient data					
1980	Insufficient data					
1981	Insufficient data					
1982	Insufficient data					

Table 12. Pairvise comparisons to shov monthly differences in probit equations for male maturity class I, by locality and year.

Locality	Year	Months compared		Length grouping c.m.	X^2 slope	P	X^2 intercept	P
Holyrood	1966	Aug.	Sept.	19-23	0.0064	0.9361	71.8239	0.0000
		Sept.	Oct.	20-25	0.3609	0.5479	0.0483	0.8259
		Oct.	Nov.	20-24	0.0429	0.8360	0.8381	0.3596
		Aug.	Oct.	20-23	1.3130	0.2519	45.2678	0.0000
		Aug.	Nov.	20-23	2.3668	0.1239	21.3588	0.0000
		Sept.	Nov.	20-24	0.5832	0.4451	1.0519	0.3051
	1967	Aug.	Sept.	19-25	0.2336	0.6289	47.9569	0.0000
	1971	Aug.	Sept.	21-24	1.2649	0.2607	43.5408	0.0000
	1973	July	Aug.	19-22	0.8906	0.3453	6.4960	0.0108
	1975	Aug.	Sept.	21-24	2.7354	0.0981	3.6007	0.0577
	1976	-	-	-	-	-	-	-
	1977	-	-	-	-	-	-	-
	1978	Oct.	Nov.	20-24	0.7756	0.3785	1.7396	0.1872
	1979	Aug.	Sept.	20-23	3.0035	0.0831	0.0276	0.8681
		Sept.	Oct.	20-24	1.8372	0.1753	55.8557	0.0000
		Oct.	Nov.	21-25	1.4921	0.2219	14.9673	0.0001
		Aug.	Oct.	20-23	7.5724	0.0059		
		Aug.	Nov.	21-23	3.3843	0.0658	47.3861	0.0000
		Sept.	Nov.	21-23	0.4149	0.5195	73.8546	0.0000
	1980	Aug.	Sept.	20-23	0.2908	0.5897	0.3604	0.5497
		Sept.	Oct.	21-23	0.0287	0.8655	1.6776	0.1952
		Aug.	Oct.	21-23	0.4708	0.4926	2.2758	0.1314
	1981	Aug.	Sept.	-	-	-	-	-

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Table 12. (Cont'd.)

Locality	Year	Months compared		Length grouping c.m.	χ^2 slope	P	χ^2 intercept	P
Twillingate	1978	Aug.	Sept.	18-21	0.1380	0.7103	26.4947	0.0000
	1979	Sept.	Oct.	21-24	-	-	-	-
	1980	Aug.	Sept.	20-23	2.8511	0.0913	12.3818	0.0004
		Sept.	Oct.	20-23	1.2036	0.2726	0.6898	0.4062
		Aug.	Oct.	20-23	0.1568	0.6921	5.1816	0.0228
Hermitage	1978	Aug.	Sept.	19-21	0.2662	0.6059	0.1244	0.7243
	1979	-	-	-	-	-	-	-
	1981	Aug.	Sept.	19-23	10.0463	0.0015		
Harbour Breton	1966	Sept.	Oct.	19-22	1.8872	0.1695	27.2215	0.0000
		Oct.	Nov.	20-22	0.0614	0.8043	0.1610	0.6883
		Sept.	Nov.	20-22	0.4804	0.4882	3.8101	0.0509
	1979	-	-	-	-	-	-	-
Rencontre West	1966	Aug.	Sept.	20-22	1.2114	0.2711	68.1010	0.0000
	1967	Aug.	Sept.	17-21	0.3147	0.5748	96.1171	0.0000
		Sept.	Oct.	17-22	2.1809	0.1397	14.9203	0.0001
		Aug.	Oct.	17-21	0.0640	0.8002	110.4700	0.0000

Table 13. Pairvise comparisons to shov yearly differences in probit equations for male maturity class I, by locality and month.

Locality	Month	Years compared		Length grouping cm	χ^2 slope	P	χ^2 intercept	P
Holyrood	Aug.	1966	1967	19-24	8.6276	0.0033		
		1966	1971	19-24	8.8121	0.0030		
		1966	1973	19-23	16.1500	0.0001		
		1966	1975	21-24	0.6468	0.4212	34.8940	0.0000
		1966	1976	21-23	2.5644	0.1093	48.5153	0.0000
		1966	1977	21-23	0.6681	0.4137	14.8264	0.0001
		1967	1971	19-24	0.1208	0.7281	47.2661	0.0001
		1967	1973	19-23	1.5174	0.2180	7.3781	0.0066
		1967	1975	21-24	3.7663	0.0523	8.1162	0.0044
		1967	1976	21-23	0.2690	0.6040	20.9056	0.0000
		1967	1977	21-23	6.7310	0.0096		
		1971	1973	19-23	1.4445	0.2294	59.1763	0.0000
		1971	1975	21-24	1.7939	0.1804	43.4816	0.0000
		1971	1976	21-23	0.0149	0.9030	64.9750	0.0000
		1971	1977	21-23	5.5545	0.0184		
		1973	1975	21-24	1.7038	0.1918	0.5559	0.4559
		1973	1976	21-23	0.0637	0.8007	7.6035	0.0058
		1973	1977	21-23	5.5618	0.0184		
		1975	1976	21-23	1.1866	0.2760	3.7362	0.0533
		1975	1977	21-23	1.7483	0.1861	0.0009	0.9766
		1976	1977	21-23	4.1941	0.0406		
		1978	1979	-	-	-	-	-
		1978	1980	-	-	-	-	-
		1978	1981	-	-	-	-	-
		1979	1980	20-23	0.0002	0.9892	4.5957	0.0321
		1979	1981	20-22	12.0632	0.0005		
		1980	1981	20-22	3.4494	0.0633	48.1905	0.0000

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Table 13. (Cont'd.)

Locality	Months	Years compared		Length grouping cm	χ^2 slope	P	χ^2 intercept	P
Holyrood	Sept.	1966	1967	19-23	13.9061	0.0002		
		1966	1971	21-23	5.9225	0.0149		
		1966	1975	21-23	2.1560	0.1420	1.8488	0.1739
		1967	1971	21-24	0.2731	0.6013	7.0813	0.0078
		1967	1975	21-24	0.3600	0.5485	2.0123	0.1560
		1971	1975	21-24	0.0655	0.7979	8.9560	0.0028
		1978	1979	-	-	-	-	-
		1978	1980	-	-	-	-	-
		1978	1981	-	-	-	-	-
		1979	1980	20-24	0.8558	0.3549	5.6808	0.0172
		1979	1981	21-23	0.2508	0.6165	4.3311	0.0374
		1980	1981	21-23	1.2535	0.2629	0.0936	0.7596
	Oct.	1978	1979	20-24	2.2304	0.1353	33.6280	0.0000
		1978	1980	21-24	2.5829	0.1080	72.4159	0.0000
		1979	1980	21-24	0.8291	0.3625	27.6546	0.0000
	Nov.	1966	1967	-	-	-	-	-
		1978	1979	21-24	0.2213	0.6380	0.7429	0.3887

Table 14. Pairwise comparisons to show spatial (locality) differences in probit equations for male maturity Class I, by year and month.

Year	Month	Localities compared		Length grouping cm	χ^2 slope	p-value	χ^2 intercept	P
1966	Aug.	Twillingate	Ren. West	19-22	1.9474	0.1629	3.5995	0.0578
	Sept.	Holyrood	Hr. Breton	19-23	27.0718	0.0000		
		Hr. Breton	Ren. West	18-22	2.3244	0.1274	84.9295	0.0000
		Holyrood	Ren. West	19-23	30.5108	0.0000		
	Oct.	Holyrood	Hr. Breton	20-23	4.2272	0.0398		
	Nov.	Holyrood	Hr. Breton	-	-	-	-	-
1967	Aug.	Holyrood	Ren. West	18-21	0.5805	0.4461	21.4539	0.0000
	Sept.	Holyrood	Ren. West	20-23	11.4112	0.0007		
1978	Aug.	Twillingate	Hermitage	19-21	1.6082	0.2047	2.1588	0.1418
	Sept.	Holyrood	Twillingate	-	-	-	-	-
		Twillingate	Hermitage	19-22	2.2874	0.1304	4.3129	0.0378
		Holyrood	Hermitage	-	-	-	-	-
1979	Sept.	Holyrood	Twillingate	21-24	2.0395	0.1533	17.4956	0.0000
		Twillingate	Hr. Breton	21-24	1.6371	0.2007	10.9445	0.0009
		Holyrood	Hr. Breton	21-24	0.0340	0.8537	0.0250	0.8745
	Oct.	Holyrood	Twillingate	21-24	0.4463	0.5041	0.1075	0.7431
		Twillingate	Hermitage	21-23	0.0094	0.9228	4.6955	0.0302
		Holyrood	Hermitage	21-23	0.0999	0.7519	7.9214	0.0049
1980	Aug.	Holyrood	Twillingate	20-23	2.0840	0.1489	22.2539	0.0000
	Sept.	Holyrood	Twillingate	21-23	5.3883	0.0203		
	Oct.	Holyrood	Twillingate	21-24	2.2732	0.1316	10.4106	0.0013
1981	Aug.	Holyrood	Hermitage	18-22	11.9521	0.0005		
	Sept.	Holyrood	Hermitage	21-23	0.5020	0.4786	24.2985	0.0000

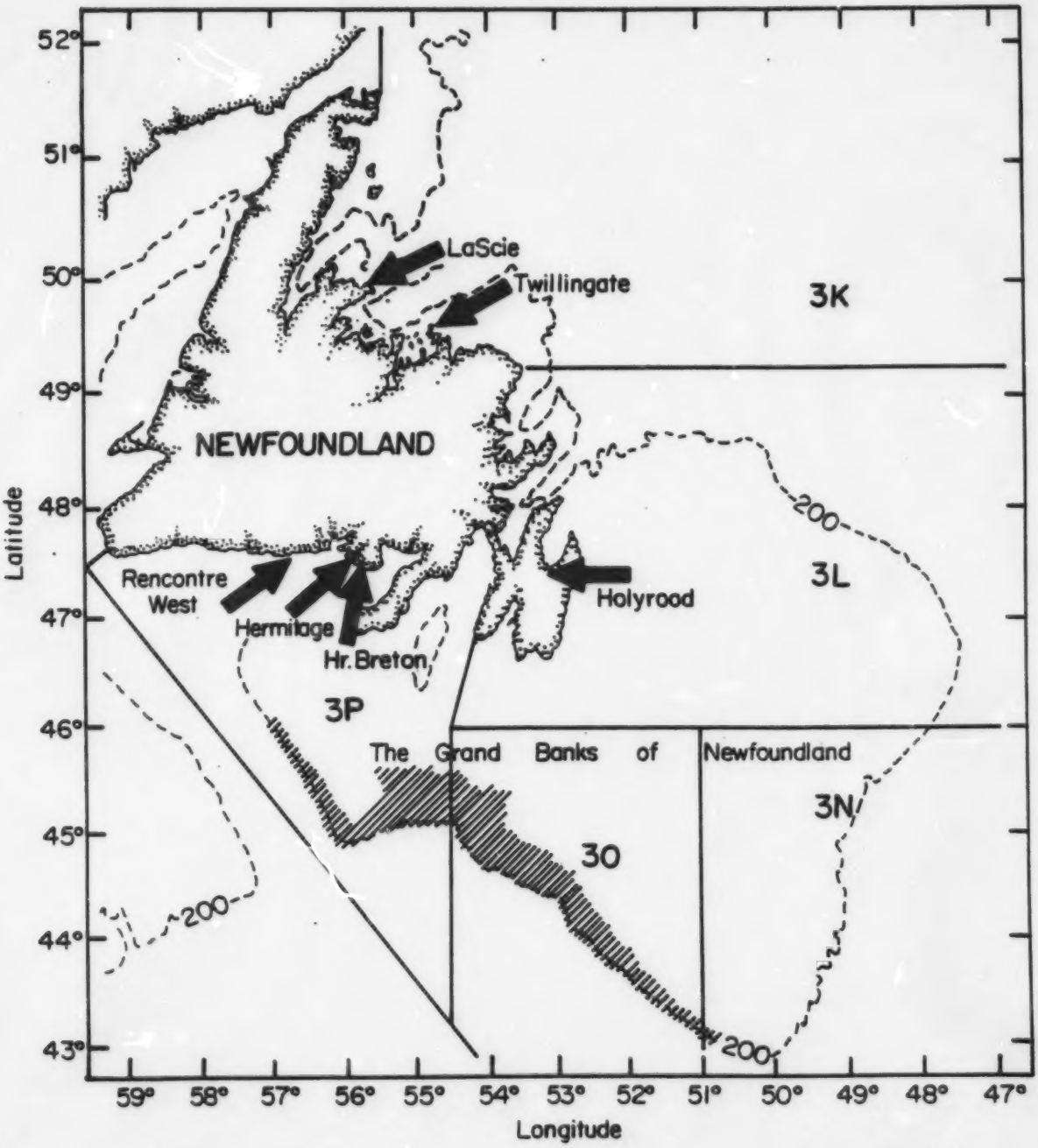

Fig. 1. Location map showing inshore squid sampling localities representing three coastal regions of insular Newfoundland (NAFO Divisions 3K, 3L and 3P), as well as the offshore sampling area (shaded).